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North Carolina Department of Transportation
Division of Highways
Statewide Planning Branch

CABARRUS - SOUTH ROWAN URBAN AREA TRANSPORTATION PLAN

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THE
CABARRUS-SOUTH ROWAN URBAN AREA
TRANSPORTATION PLAN

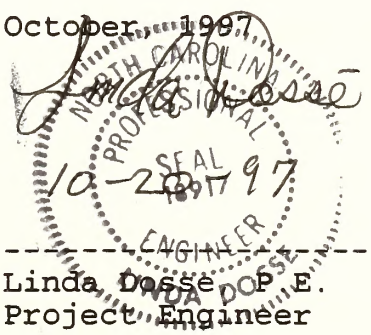
Prepared by the:

Statewide Planning Branch
Division of Highways
North Carolina Department of Transportation

In Cooperation with:

The County of Rowan
The Town of China Grove
The Town of Landis
The City of Kannapolis
The City of Concord
The Town of Harrisburg
The County of Cabarrus
The Federal Highway Administration
The United States Department of Transportation

October, 1997



Linda Dosse P.E.
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ACKNOWLEDGEMENTS

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I. INTRODUCTION

This report documents the work done toward the 1996 Transportation Plan mutually adopted by the Cities of Concord and Kannapolis, the Towns of China Grove, Landis and Harrisburg, the Counties of Rowan and Cabarrus, and the North Carolina Department of Transportation.

The last update of the Cabarrus-South Rowan Urban Area plan was adopted in 1988. Since then several major projects have been scheduled for implementation in the State Transportation Improvement Program. The Kannapolis Loop Road was completed in the early 1990's. The NC136 extension, Speedway/Kings Grant Boulevard, the Earnhardt Road interchange, and Copperfield Boulevard were completed in the mid-90's. Project sections U-2009 and R-2246 of the Westside Connector, and Dale Earnhardt Boulevard relocation were also added in the last few years.

Also changed since the last update is the expansion of the planning area, the Metropolitan boundary and the inclusion of the Town of Harrisburg in the Metropolitan Planning Organization (MPO). The Cabarrus-South Rowan Urban Area is located in the western Piedmont of North Carolina in western Cabarrus and Southern Rowan Counties between the Cities of Charlotte and Salisbury. See Figure 1-1 for a geographic location of the urban area.

The major changes in this report from previous technical reports for the area are the amount and type of information included. There is the standard information on deficiency analysis, environmental concerns, recommendations, implementation, and the street index. There is also new and more indepth information on public involvement, and associated studies and the metric system references throughout as required by recent federal regulations.

The system of thoroughfares recommended in this study was developed using the principles of thoroughfare planning outlined in Appendix A and the methodology found in Appendix B of this report. The recommended cross sections found in Chapter II and Appendix H are based on existing conditions and the expected volumes of traffic in the design year of 2020. Every effort was made to use as much of the existing street system as possible to minimize costs and environmental disruption. The locations of new facilities were based on field investigation, existing land use, proposed land uses, and topographic conditions. The locations of the proposed facilities are preliminary and a more detailed evaluation will be necessary before any project can be constructed.

The Intermodal Surface Transportation Efficiency Act (ISTEA) was passed into law in 1991. This new law now requires states and urban areas to measure, analyze, and report more and different information about the performance of their transportation systems. The long range plan must: identify all transportation facilities (including pedestrian walkways and bicycle transportation

facilities), include a financial plan that demonstrates how the long range plan can be implemented, assess capital investment and other measures necessary to preserve the existing transportation system and to make the most efficient use of those facilities to relieve congestion, and indicate appropriate transportation enhancement activities. There must be reasonable opportunity for public comment on the long range plan before it is approved.

This report documents in Appendix E the public involvement process used for the study. Appendix G documents the Major Investment Study for the possible widening of I-85. The rest of the topics will be reported under separate cover.

GEOGRAPHIC LOCATION
FOR
CABARRUS AND ROWAN COUNTIES
NORTH CAROLINA

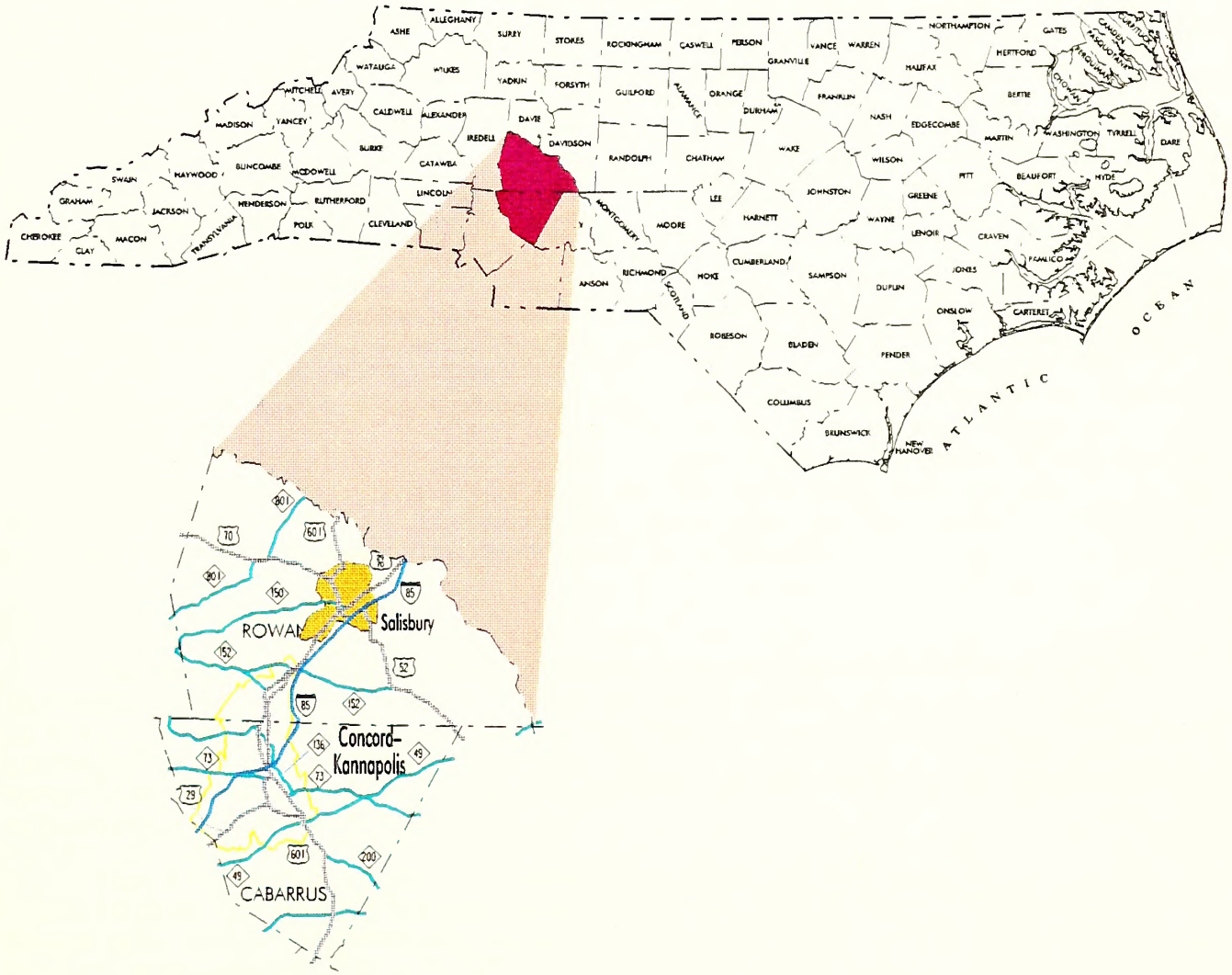


FIGURE 1–1

II. RECOMMENDATIONS

The thoroughfares on the recommended plan can be divided into three types of roads. They are freeways/expressways, major thoroughfares, and minor thoroughfares. All other streets are considered local collector streets. All the roads on the recommended plan are detailed in Appendix H and shown graphically on Figure 2-1.

A. FREEWAYS/EXPRESSWAYS

The freeway/expressway system is intended for fast and efficient movement of large volumes of traffic in and around an urban area. Properly located freeways and expressways can help relieve overburdened radials and move traffic from one suburb to another around the central core.

There is only one controlled-access Interstate highway in the area. **I-85** runs north and south through the center of the urban area and the State connecting several of its urban areas. I-85 was recently widened to eight lanes through the City of Charlotte and another section of the Interstate through Rowan County is scheduled for widening in the FY1996 State Transportation Improvement Program. The projected traffic on I-85 for the design year warrants widening to eight lanes through the planning area. The facility can be widened within the existing right-of-way for most of the 18 mile (30 km) length.

There are seven interchanges on I-85 through the planning area. A **new interchange** is recommended at Old Beattys Ford Road near Landis. There is a five-mile stretch between the interchange at NC 152 and the one at Lane Street. Industrial land uses are being planned along China Grove Road increasing the potential for truck and other vehicle traffic in the area. An interchange is proposed in the State Transportation Improvement Program with the Westside Connector. There is another at Speedway Boulevard. These ten interchanges are strategically placed for maximum access to the Interstate from the surrounding property.

B. MAJOR THOROUGHFARES

The major thoroughfares are the principle traffic carriers throughout the urban area. Their primary function is to carry traffic, but they also may service abutting property. Too much property access, though, requires too many traffic signals. Too many traffic signals reduces the travel speed, capacity, and efficiency of a thoroughfare.

The following is an alphabetical listing and short description of the major thoroughfares on the Thoroughfare Plan. These are only recommended improvements and are subject to change due to availability of funds.

Alexander Avenue - This is a dead-end street in Harrisburg. It is recommended that it be extended to meet Robinson Church Road and widened to a three-lane urban section with a bridge over the railroad tracks to connect northern and southern Harrisburg across NC 49.

Cabarrus Avenue (SR 1002) - This is the main east-west street across downtown Concord and connects US 29 to Old Salisbury Road. A four-lane urban section from US 29 to NC 136 through downtown is recommended.

Caldwell Road (SR 1173) - This road is on the west side of Harrisburg, which is expected to grow considerably during the planning time span. It is recommended that the road be widened to a full two-lane shoulder section and extend across NC 49 to US 29 parallel to Morehead Road to spread out the expected traffic between the two roads.

Central Drive - This short section of road in Concord is used as a cut-through between NC 73 and US 29. It is recommended that it be widened to a four-lane urban section for turn lanes between NC 73 and US 29.

Church Street (US 601 BUS, NC 73) - This stretch is still heavily travelled, even with the US 601 bypass. Only two sections are recommended for improvement--Five lanes between US 29 and Todd Drive and three lanes between Douglas Avenue and Cabarrus Avenue.

Dale Earnhardt Boulevard (SR 2126) (U-2833) - The future land use in this area is planned light industrial and commercial. This road is also planned as an entrance into the City of Kannapolis from the Interstate to complete the multi-lane loop around the central city. The recommendation is to widen to a five-lane urban section from the I-85 interchange to the first bend of Earnhardt Road then on new location to the NC 136 and Centerview Road intersection.

Derita Road (SR 1445) - This stretch of road near Concord now has the entrance for the Concord Regional Airport and connects to one end of the Kings Grant Boulevard. It is recommended that it be widened to a four-lane urban section from the Mecklenburg County line to Poplar Tent Road. Also it is recommended that at Poplar Tent Road Derita Road and Odell School Road be aligned.

Flat Rock Road (SR 1210) - This is a main road into Landis. It is recommended it be widened to a minimum 22-foot (6.6-meter) section between NC 152 and the Town limits.

Harris Road (SR 1449) - This is a road located in rapidly growing western Cabarrus County. It is recommended it be widened to a full 24-foot (7.2-meter) section from Odell School Road to the Mecklenburg County line.

Industrial Park Road - This road is located in a growth area on the west side of Harrisburg. It is recommended that the present cul-de-sac be extended as a three-lane section to Stallings Road parallel to NC 49 and the railroad across the southern section of Harrisburg.

Loop-Jackson Park-Lane Street (SR 1691,1131,2000,2180) - This is a completed part of the 1988 Thoroughfare Plan. The existing cross section should be adequate to carry future year traffic inside Kannapolis. The existing four-lane urban section of Lane Street should be extended across I-85 to Old Salisbury Road.

Main Street (US 29A) - This road runs through China Grove, Landis, and Kannapolis into Concord. There is still tremendous traffic on this road even with the parallels of Ridge Road, US 29, and I-85. The recommendation for this road is a minimum full three-lane urban section for the entire length and a reduction in parking where possible.

McGill Street - This is a major east-west entrance into Concord from Poplar Tent Road. The recommendation is to widen to a four-lane urban section from Brookwood Extension to Church Street.

Morehead Road (SR 1300) (U-3115) - This is a major entrance into Harrisburg. There is already considerable traffic on this road and the land use is developing quickly. The recommendation is to widen the road to a three-lane urban section inside Harrisburg and a five-lane urban section from Mallard Creek to US 29.

NC 49 (R-2215, R-2533) - This road is on the North Carolina Intrastate System and on the National Highway System. It is also a heavily travelled route into Charlotte. It is recommended that it be widened to a four-lane divided rural section from the eastern planning boundary to the Harrisburg City Limits and a narrow seven-lane urban section through Harrisburg to the Mecklenburg County line.

NC 73 (R-2410) - This road is a heavily travelled connection between northern Mecklenburg County, Concord, and Albemarle. The recommendation is to widen the facility to a five-lane urban section west of Kannapolis and inside Concord, then a three-lane section east of Concord.

NC 136 (U-3440, U-530) - This road connects Iredell County to and through Kannapolis to Concord. It is recommended that the facility be widened to three lanes from the Iredell County line across the Westside Connector to the Loop Road in Kannapolis and to five lanes from the new Earnhart Road intersection to NC 73 in Concord.

NC 152 - This is the northernmost east-west link in the planning area. A two-lane northern bypass around China Grove is recommended to alleviate turning traffic at the Church and Main Street intersection. Also included are improvements to the

interchange with US 29 and I-85 with a five-lane bridge section across US 29 and I-85 and a three-lane section east of I-85.

Northern Corridor - This is a recommended new facility around Harrisburg. It connects NC 49 and Morehead Road northeast of Harrisburg with a two-lane section to send some traffic around the center of Town.

Odell School Road (SR 1442) - This road is in the high growth area of western Cabarrus County. The recommendation is two lanes from NC 136 to NC 73 and four lanes from NC 73 to Poplar Tent Road with a realignment of the dog-leg intersection at Derita Road.

Old Beattys Ford Road (SR 1210,1221) - This road is a main route from Landis. Industrial land uses are being planned along China Grove Road in this area increasing the potential for truck and other vehicle traffic. The recommendation for this road at present is widening to two 22-foot (6.6-meter) lanes from US 29 to the planning boundary with a new interchange with I-85.

Old Charlotte Road (SR 1335, 1157) - This stretch of road connects US 601 and NC 49 and carries traffic in and out of Concord. To accommodate the expected increase in traffic the recommended cross section is five-lane urban from US 601 to Roberta Road and four-lane urban from Roberta Road to NC 49.

Old Salisbury Road (SR 1002) - This road is one of the main roads into downtown Concord from eastern Cabarrus County. Growth on the east side of Concord is expected to be moderate because of the extensive environmental constraints of the Coldwater Creek basin. The recommended cross section for the road, though, is a three-lane section from NC 136 to the eastern leg of Penninger Road and a full two-lane section out to the Planning Boundary.

Pitt School Road (SR 1305) - This road is in the high growth area in western Cabarrus County. The recommended section is four-lane urban. Also recommended is a relocation of the dangerous intersection with Poplar Tent Road away from I-85 to Shelton Road.

Poplar Tent Road (SR 1394) - This facility is a heavily traveled route into Concord from the West. Development has grown along the road increasing turning traffic. The recommended section is five-lane urban from the Mecklenburg County line to US 29.

Roberta Road (SR 1304) - This road is a heavily travelled connector between Concord and Harrisburg. There is also potential for residential development growth in the corridor. The recommended cross section is a five-lane urban section.

Robinson Church Road (SR 1166) - This road leads into Harrisburg from the South. The recommended section is two-lane rural from the Mecklenburg County line to Tom Query Road. At this point it should meet the Alexander Road Extension.

Rocky River Road (SR 1139) - This road is a route between Concord and Mecklenburg County. The recommendation is four-lane urban.

Ryder Road (SR 1210) - This road runs through the center of Landis. The existing cross section should be adequate to accommodate anticipated traffic volumes.

Southern Corridor - This is a new facility recommended to lessen some of the traffic on NC 49 and to give Harrisburg another grade separation over the railroad. The recommended section is two-lane rural from Robinson Church Road to NC 49.

Stallings Road (SR 1161) - This road has experienced a lot of residential growth. The recommended section is three-lane to accommodate the expected turning traffic. Also suggested is a relocation of the western end to meet the Southern connector south of the railroad and eliminate an at grade crossing.

Tom Query Road (SR 1166) - This road brings traffic into Harrisburg from Mecklenburg County. The recommended section is a wide two-lane urban section. Also suggested is to connect the road to the Southern Connector at Robinson Church Road.

Union Street (US 601 BUS) - This area is mostly residential and an effort has been made to divert traffic away from it. The recommended section is five-lane urban from NC 136 to US 601.

US 29 (U-3115) - This road forms part of the spine of the road network through the area. Because of its length and the varied land uses along it different cross sections are necessary. The recommended cross sections are four-lane divided rural from I-85 to NC 136 in Kannapolis, seven-lane urban from I-85 to Church Street in Concord, five-lanes urban from Church Street to Cabarrus Avenue, seven-lanes urban from Cabarrus Avenue to Rock Hill Church Road, six-lane divided urban from Rock Hill Church Road to Speedway Boulevard, seven-lanes urban from Speedway Boulevard to Caldwell Road, and six-lane divided urban from Caldwell Road to the Mecklenburg County line.

US 601 - This road helps take traffic around the Concord Central Business District and out into southern Cabarrus County. Traffic has increased on the facility over the years and land use development has increased along the road. The recommended cross section is five-lane urban from US 29 to South Union Street, seven-lanes from South Union Street to Flowes Store Road, and four-lanes divided rural to the planning boundary.

West C Street (SR 1124, 1680) - This road brings traffic directly into the Kannapolis Central Business District from the West. It has residential land use along it, therefore, the recommended section is three-lane urban. A three-lane extension to the Westside Connector is also recommended.

Westside Connector (R-2246, U-2009) - This facility is recommended to alleviate some of the traffic problems on Main Street, US 29, and other parallel roads that were not designed for it. The recommendation for this facility is a four-lane divided rural section from NC 49 to north of NC 152 except along existing Crisco Road which should be five-lane urban.

Zion Church Road (SR 1482, 1155, 1152) - This road is a heavily travelled connection between US 601, NC 49, and points south into residential development. The recommended section is a four-lane urban.

C. MINOR THOROUGHFARES

The minor thoroughfare system collects local traffic from the residential neighborhoods, commercial and industrial districts and distributes it to the major thoroughfare system. The purpose of these roads is to access abutting property. They cannot carry large volumes of traffic as well as the major thoroughfares can.

The following is an alphabetical listing and short description of the minor thoroughfares on the Thoroughfare Plan. These are only recommended improvements and are subject to change due to availability of funds.

Airport-Homer Corriher Road (SR 1182, 1198) - This road would serve as a loop around the southwest of Landis. The recommended section, existing and proposed, is a 22-foot (6.6-meter) section.

Archibald Road (SR 1153) - This road connects two major thoroughfares south of NC 49. The existing 22-foot (6.6-meter) cross section should be sufficient for the anticipated traffic.

Blackwelder Road (SR 1307) - This road is located between Concord and Harrisburg. The anticipated land use along this road is residential, therefore, the recommended cross section is three-lane urban to provide for anticipated turning traffic.

Bostian Road (SR 1221) - This road is located between China Grove and Landis. With Kimball Road and its extension across the railroad tracks a crosstown connection is formed between NC 152 and Old Beatty's Ford Road. The existing 22-foot (6.6-meter) section should be sufficient to handle the anticipated volumes.

Brantley Road (SR 2000) - This road is one of the several radial routes out of the center of Kannapolis. The recommended cross section is a 22-foot (6.6-meter) two-lane.

Brookwood Avenue - This road crosses Concord north of the Central Business District. The land use is mostly residential, therefore, the recommended section is two-lane urban with plenty of room for street parking from Burrage Road to Church Street. Also it is recommended that the road be extended over the railroad tracks to meet McGill Street.

Brown Road (SR 1211) - This road brings traffic into the planning area from western Rowan County. The recommended cross section is a 22-foot (6.6-meter) rural section.

Burrage Road - This road runs mainly through the residential area of eastern Concord. The existing cross section should be sufficient to accommodate the anticipated traffic.

Cannon Farms Road (SR 1197) - This road connects Landis and the Enochville area. It is recommended that this stretch of road be widened to a full two-lane section.

Centergrove Road (SR 2114) - This road brings traffic into Kannapolis from the east side of the planning area. Expected traffic volumes recommend widening the facility to a two-lane, 22-foot (6.6-meter) rural section.

Centerview Drive - This road is a connector between Main Street and US 29. The existing cross section should be sufficient to accommodate anticipated traffic.

China Grove Road (SR 1238, 2202) - This road parallels I-85 between China Grove and Kannapolis. The recommended cross section is a two-lane 22-foot (6.6-meter) rural section.

Chestnut Drive - This road, along with Lincoln Street, runs through a residential neighborhood in southern Concord. The recommended section is two-lane 22-foot (6.6-meter) rural.

Church Street (SR 1337) - This road is the main route into China Grove from the West. The recommended section is a wide two-lane with parking. Between Main Street and US 29 the cross section should be sufficient.

Coldwater Connector - This facility is part of a proposed system of connected secondary roads east of Concord. The proposed cross section is four-lane urban from Copperfield Boulevard at I-85 to Penninger Road. This will ultimately allow access to the Interstate from NC 73, NC 49 and US 601 around Concord.

Concordia Church Road (SR 1353) - This is a secondary road west of China Grove. The existing 22-foot (6.6-meter) cross section should be sufficient for the anticipated traffic.

Copperfield Boulevard - This road connects I-85 and NC 136. The existing five-lane, 66-foot (9.9-meter) cross section should be ample enough for the anticipated traffic volumes.

Corban Avenue - This road is in the Concord Central Business District. The recommended section is a wide two-lane for parking. Also, it is recommended that the at-grade rail crossing be closed and traffic diverted to Cabarrus Avenue using Powder Street.

Crestmont Drive (SR 2643) - This is part of the proposed connector east of Concord from Old Salisbury Road to US 601. The recommended cross section is three-lane urban for both the existing and proposed segments.

Dakota Street - This street is a connector between Main Street and US 29 in Kannapolis. Kannapolis has very few east-west facilities mainly because of the railroad track through the center of town. This proposed facility should help solve that problem. The recommended section is a wide two-lane urban section from the Westside Connector to Dale Earnhardt Boulevard with a grade separation over the railroad tracks.

Deal Road (SR 1353) - This road is located in the far west but growing part of the planning area. The recommended cross section is a two-lane 22-foot (6.6-meter) rural section.

Dogwood Boulevard (SR 1838) - This road is located in the high growth area of Kannapolis and western Cabarrus County. Kannapolis lacks sufficient crosstown traffic patterns and this proposed facility should help solve that problem. The recommended cross section for both the existing and proposed pieces is a two-lane 22-foot (6.6-meter) rural section from Trinity Church Road across the Westside Connector to Rogers Lake Road.

Drakeside Road (SR 1622) - This road is located in the high growth area of western Cabarrus County. The recommended cross section is a two-lane 22-foot (6.6-meter) rural section.

Ebenezer Road (SR 1267, 1322) - This road brings traffic into northern Kannapolis from the East. It is recommended that the at-grade railroad crossing be closed and the rest of the road be widened to a two-lane 22-foot (6.6-meter) rural cross section.

Enochville Avenue (SR 1351) - This road runs through the center of the unincorporated but growing area of Enochville west of Kannapolis. The recommended cross section is a two-lane 22-foot (6.6-meter) section.

Enochville Road (SR 1351) - This road brings traffic into unincorporated Enochville from the West. The recommended improvement is a two-lane, 22-foot (6.6-meter) section from the Westside Connector to Deal Road.

Enochville School Road (SR 1360) - This road obviously serves the local school. The recommended cross section is a two-lane, 22-foot (6.6-meter) rural section.

Evelyn Street - This road is located in a residential area in eastern Kannapolis. There is over a mile-and-a-half distance between US 29 and China Grove Road. Another facility is needed to improve the access to the neighborhood. The recommendation is for a wide two-lane section from Brantley Road to Moose Road and on the proposed extension from Moose Road to Ebenezer Road.

First Street (SR 1706) - This road brings traffic into the Central Business District of Kannapolis from the East. The existing cross section from Midlake Avenue to US 29 should be sufficient, but the recommended section from US 29 to Main Street is a two-lane, 22-foot (6.6-meter) rural section.

Flowes Store Road (SR 1132) - This road is located in a growing residential area in southern Concord. The recommended cross section is a three-lane urban section to accommodate anticipated turns.

Gold Hill Road (SR 2408) - This road brings traffic into the planning area from eastern Cabarrus County. The existing through-lane width should be sufficient to handle future traffic, but it is recommended that additional right-of-way be obtained for possible periodic turn lanes.

Hickory Ridge Road (SR 1138) - This road is located in southeast Harrisburg. The recommended cross section is a two-lane, 22-foot (6.6-meter) rural section from Rocky River Road to Stallings Road and from Railroad Avenue to School Circle. It is suggested that the at-grade railroad crossing be closed.

International Drive (SR 1429) - This road is a connector between NC 73 and Poplar Tent Road and the potential land use is light industrial. The existing cross section should be sufficient to handle the anticipated automobile and truck traffic.

Kerr Street - This street is a connector between McGill Street and Cabarrus Avenue in the residential neighborhood west of the Concord Central Business District. The recommended section is a wide two-lane urban with room for parking.

Kimball Road (SR 1211) - This road runs between China Grove and Landis. The existing cross section of the existing portion of road should be sufficient for anticipated volumes. The recommended cross section for the proposed railroad overpass and extension to US 29 is a wide two-lane urban section.

Lake Concord Road (SR 2081) - This road is located near the regional hospital. The existing section should be sufficient for anticipated traffic, but additional right-of-way should be purchased for possible future turn lanes on both sides of the thoroughfare.

Lentz Road (SR 1337) - This road brings traffic into China Grove from the East. The recommended section is a two-lane, 22-foot (6.6-meter) rural section.

Lentz-NC 152 Connector - This proposed facility parallels I-85 west of China Grove. The recommended cross section is a full two-lane rural section.

Lincoln Street - This street, along with Chestnut Drive, is located in a residential neighborhood in southern Concord. The recommended cross section is a two-lane, 22-foot (6.6-meter) rural section.

Little Texas Road (SR 2154) - This road is a connector between Lane Street and NC 136 on the east side of Kannapolis. The existing cross section should be sufficient to hold anticipated traffic volumes.

Mall Road - This proposed facility should somehow connect NC 136 and US 29 in Concord between the regional shopping mall and the regional hospital, both high traffic generators. The recommended cross section is a five-lane urban section.

Midlake Avenue (SR 2198) - This road is a connector road on the east side of Kannapolis. The recommended cross section is a two-lane, 22-foot (6.6-meter) rural section from Brantley Avenue to Centergrove Road.

Miller Road (SR 1509) - This road brings traffic into China Grove from the North. The present cross section should be sufficient to handle anticipated traffic volumes.

Moose Road (SR 1308) - This road is located in eastern Kannapolis. The land use is residential, industrial, and recreational in nature. Access to Lake Fisher and a Minor League baseball field is along this road. The existing cross section from Ebenezer Road to China Grove Road should be sufficient, but it is recommended that the stretch from China Grove Road to Old Beatty Ford Road be widened to a two-lane, 22-foot (6.6-meter) rural section.

Mt Moriah Church Road (SR 1197) - This road runs around the north side of Landis. The recommended cross section is a two-lane, 22-foot (6.6-meter) rural section.

Mt Moriah Church-NC 152 Connector - This facility is recommended to complete a loop around China Grove and Landis in an attempt to reduce the traffic congestion in their Central Business Districts along Main Street. The recommended cross section is a wide two-lane urban section.

NC 153 - This road brings traffic into Landis from the West. The recommended cross section is a full two-lane section from NC 152 to Cannon Farm Road and a three-lane urban section from Cannon Farm Road to Main Street.

Oakwood Avenue (SR 1745) - This road is located in a residential area of western Kannapolis between Main Street and the proposed Westside Connector. The existing cross section should be sufficient to hold anticipated traffic but it is recommended that additional right-of-way should be purchased to accommodate future turn lanes.

Old Airport Road (SR 2635) - This road is located in a growing residential area of eastern Concord. The recommended cross section is a two-lane, 22-foot (6.6-meter) rural section.

Old Charlotte Road (SR 1335, 1157) - This stretch of road connects Cabarrus Avenue and US 601 in Concord. The recommended cross section is a wide two-lane section.

Orphanage Road (SR 1778) - This road is located in a residential area of western Kannapolis. The existing cross section should be sufficient to handle the anticipated traffic, but it is recommended that additional right-of-way be purchased for potential turn-lanes.

Patterson Road (SR 1225) - This road connects NC 152 and Main Street in China Grove. The existing cross section in Town from Grants Creek to Main Street should be sufficient, but it is recommended that the stretch from Grants Creek to Flat Rock Road should be widened to a full two-lane section.

Penninger Road (SR 2113) - This road is located east of Concord. The existing cross section on the eastern side of this loop road should be sufficient for the anticipated traffic, but it is recommended that more right-of-way be purchased for potential turn-lanes. It is recommended that the western portion of the loop, as part of a system of connected secondary roads east of Concord, should have a three-lane urban cross section.

Pharr Mill Road (SR 1158) - This road is located between Concord and Harrisburg. There is considerable industrial development along the north end of the road near NC 49, therefore, it is recommended that it be widened to a four-lane urban section to accommodate anticipated turning and truck traffic. It is also recommended that the stretch from Mulberry Road to Rocky River Road be a two-lane, 22-foot (6.6-meter) rural section.

Plaza Road Extension (SR 1171, 1176) - This road brings traffic into southwest Harrisburg from Mecklenburg County. The recommended cross section is a four-lane urban section to accommodate through lanes and anticipated turning traffic.

Plum Road (SR 1615) - This road is located west of Kannapolis. The recommended cross section is a two-lane 22-foot (6.6-meter) rural section.

Railroad Avenue - This road is located in Harrisburg, parallel to the railroad tracks. It is recommended that the Hickory Ridge Road at-grade crossing be closed, therefore, it is anticipated that there will be an increase in traffic on this facility. The recommended cross section is a wide two-lane urban section.

Rainbow Drive (SR 1371, 1643) - This road is located in a mostly residential area of Kannapolis. The recommended cross section is a wide two-lane urban section.

Rankin Road (SR 1616) - This road is located in the high growth area of western Cabarrus County. The recommended cross section is a two-lane 22-foot (6.6-meter) rural section.

Ridge Avenue (SR 2001) - This road parallels the railroad tracks and Main Street in Kannapolis. The land use is mostly residential and commercial. The existing cross section should be enough to handle any increases in traffic, except for the stretch from US 29 to Thirteenth Street. The recommended section is a wide two-lane urban section.

Robinson Church Road (SR 1166) - This short stretch of the road is in Harrisburg. The recommended cross section is a wide two-lane section.

Rock Hill Church Road (SR 1414) - This road is located in mostly residential western Concord. The recommended cross section from Poplar Tent Road to Weddington Road is a wide two-lane urban section and an even wider two-lane from Weddington Road to US 29. The curve between Poplar Tent Road and Weddington Road should be reduced or eliminated for safety.

Rogers Lake Road (SR 1625) - This road is located in western Kannapolis and along with Universal Street forms one of the few crosstown facilities in the City. The recommended cross section is a full two-lane rural section from the Westside Connector to Oakwood Avenue and a wide two-lane urban section from Oakwood Avenue to Universal Street.

School Circle (SR 1163) - This road is within the Town of Harrisburg. The recommended cross section is a two-lane urban section with room for parking.

Shamrock Road (SR 1160) - This road is east of Harrisburg. It is recommended that the at-grade railroad crossing be closed and the road relocated to meet the Southern Corridor around Harrisburg. The recommended cross section for the new facility is a full two-lane rural section. The existing cross section should be sufficient to handle the anticipated traffic, but it is recommended that additional right-of-way be purchased for potential turn-lanes around the increasing residential development.

Thom Street (SR 1232) - This road is located in China Grove between Main Street and US 29. The recommended cross section is a wide two-lane urban section.

Trinity Church Road (SR 1632) - This road is located in the high growth area of western Cabarrus County. The recommended cross section for the stretch from NC 73 to the Westside Connector is a five-lane urban section to accommodate turning traffic into Rowan-Cabarrus Community College, and a full two-lane rural section from the Westside Connector to Drakeside Road.

Tuckaseegee Road (SR 1616) - This road is located in the high growth area of western Cabarrus County. The recommended cross section is a two-lane, 22-foot (6.6-meter) rural section.

Turkey Road (SR 1349, 2205) - This road is located just east of I-85 and a connector between Moose Road and Lane Street in Kannapolis. The recommended cross section is a two-lane, 22-foot (6.6-meter) rural section.

Unity Road (SR 1355, 1614) - This road is located in the western part of the planning area. The recommended cross section is a two-lane, 22-foot (6.6-meter) rural section.

Universal Street (SR 1166) - This road, along with Rogers Lake Road, forms one of the crosstown facilities in Kannapolis. The existing cross section should be sufficient to handle anticipated traffic.

Upper Enochville Road (SR 1104) - This road connects the unincorporated area of Enochville and the City of Kannapolis. The recommended section is two-lane, 22-foot (6.6-meter) rural.

Weddington Road (SR 1431) - This road parallels Poplar Tent Road and US 29 and the land use is mostly residential. Both ends of the road should be extended -- one toward US 29 and the other toward Speedway Boulevard. The recommended cross section is a three-lane urban section to accommodate turning traffic.

West A Street (SR 1100) - This street runs through a residential area of Kannapolis from the Central Business District. The recommended cross section is a wide two-lane urban section to allow parking.

Wilshire Avenue (SR 1157) - This road is located in southern Concord. This facility, with the completed extension to NC 136 will move traffic across town. The recommended cross section is a four-lane urban section.

Windy Road (SR 1442) - This road is located in the far western portion of the planning area and the existing cross section should be sufficient to accommodate anticipated traffic volumes.

Winecoff School Road (SR 1790) - This road is located between Concord and Kannapolis. The recommended cross section is a wide two-lane urban section.

Wright Road (SR 1359, 1363) - This road is located in the unincorporated area of Enochville. The recommended cross section is a two-lane, 22-foot (6.6-meter) rural section.

Zion Church Road East (SR 1153) - This road is located in southern Concord and the existing cross section should be sufficient to handle anticipated traffic.

D. COST ESTIMATES, BENEFITS ANALYSIS AND CONSTRUCTION PRIORITIES

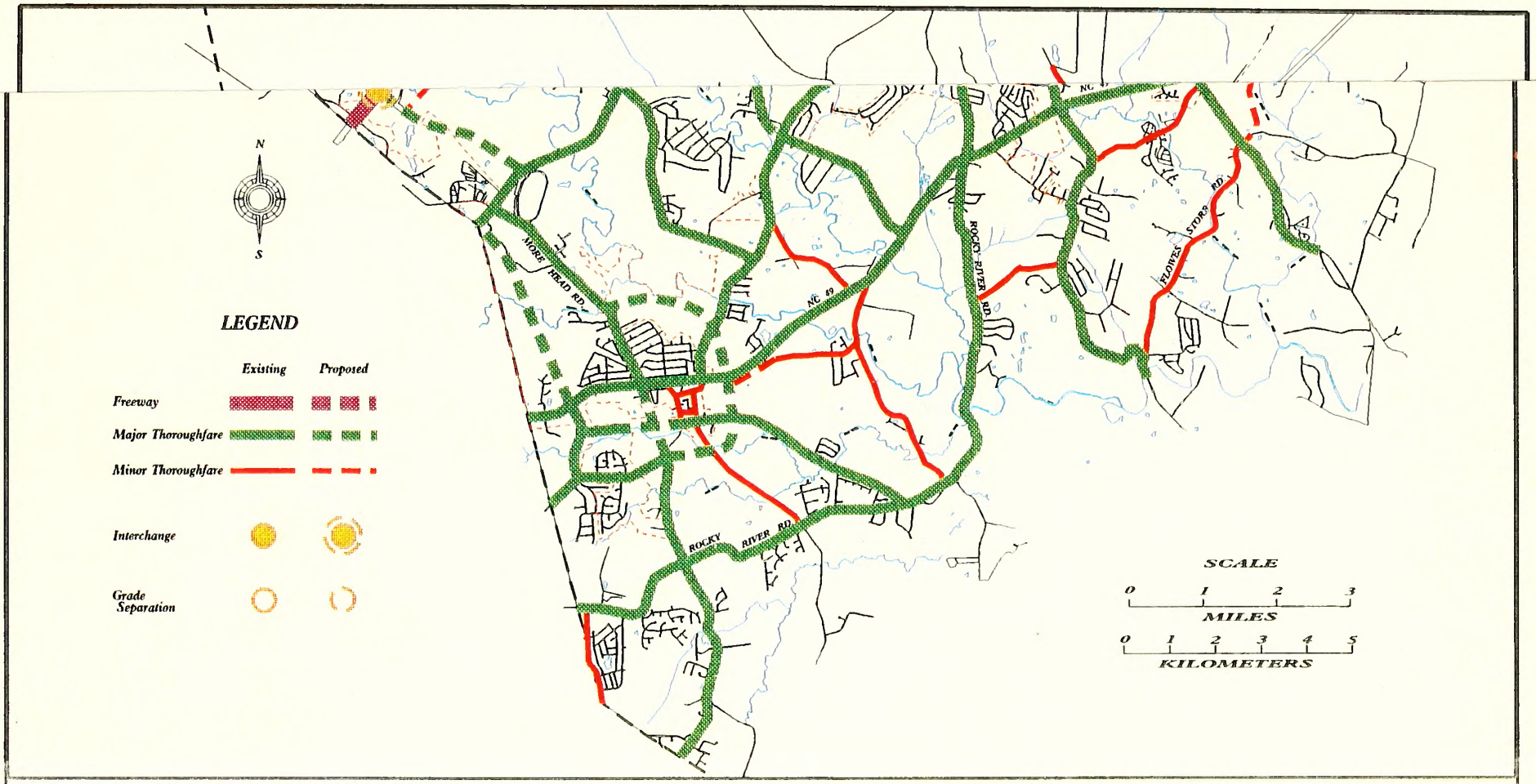
The assessment of individual projects is just as important as the assessment of the whole street system. Several factors -- social, environmental, cost, user benefits, economic development potential and politics -- must all be considered during the cost/benefit evaluation process.

Each year the Cabarrus-South Rowan Transportation Advisory Committee and the North Carolina Department of Transportation consider these factors when they prioritize their transportation needs for the Metropolitan Area. This list of priority projects is used to determine funding levels and construction schedules in the annual Transportation Improvement Programs (TIPs).

Several qualities of each project, both objective and subjective, were compared. They were: construction costs, right-of-way costs, user benefits, economic impacts, and environmental impacts (See Table 2-1). Construction and right-of-way costs are actual dollar costs related to the project. User benefits are an estimate of dollar savings. The impacts are subjective estimates of the probability of the resulting change.

The existing and proposed facilities were compared, whether widening or new location, in terms of vehicle operating costs, travel time costs, and accident costs. These user benefits are computed as total dollar savings over the design period using project length, base and design year traffic volumes, speed, facility type, and volume/capacity ratio.

Economic development potential relates to the probability that a project will stimulate the economic development of an area by providing access to developable land and reducing transportation costs. It is a subjective estimate based on knowledge of the proposed project, local development characteristics, and area land development potential. The scale is from zero, or no probability for growth, to 1.00, or excellent probability for growth.



ADOPTED BY:

KANNAPOLIS	March 25, 1996
CONCORD	March 14, 1996
CHINA GROVE	March 5, 1996
LANDIS	March 4, 1996
HARRISBURG	March 11, 1996
CABARRUS COUNTY	March 19, 1996
ROWAN COUNTY	March 7, 1996

RECOMMENDED BY:

STATEWIDE PLANNING May 17, 1996

N. C. DEPT OF TRANSPORTATION June 7, 1996

TRANSPORTATION ADVISORY COMMITTEE April 24, 1996

Base Map
June, 1995

THOROUGHFARE PLAN

CABARRUS – SOUTH ROWAN

CABARRUS COUNTY
ROWAN COUNTY
NORTH CAROLINA

PREPARED BY
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH – GIS BRANCH
IN COOPERATION WITH THE
U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

FIGURE 2-1

D. COST ESTIMATES, BENEFITS ANALYSIS AND CONSTRUCTION PRIORITIES

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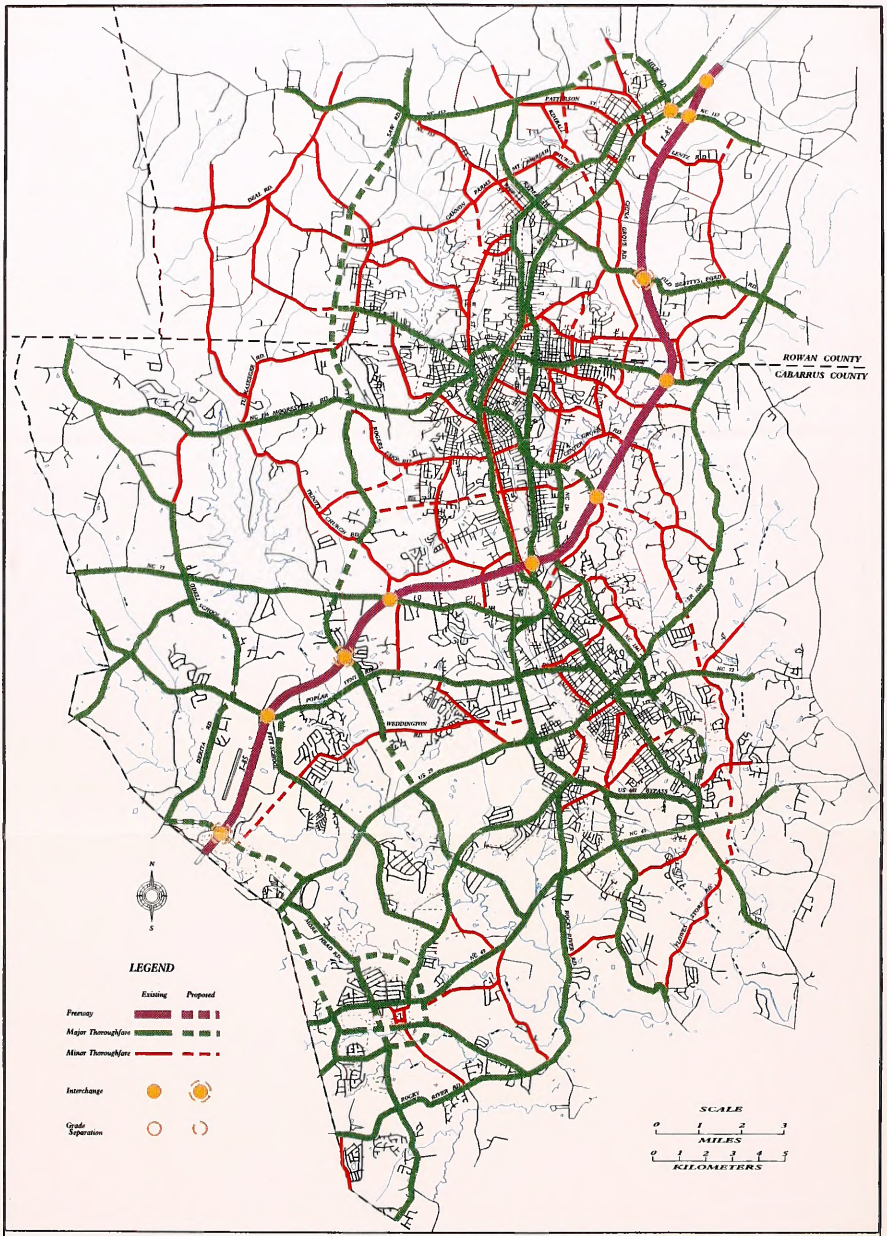

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TRANSPORTATION ADVISORY COMMITTEE April 24, 1996

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THOROUGHFARE PLAN

CABARRUS – SOUTH ROWAN

CABARRUS COUNTY
ROWAN COUNTY
NORTH CAROLINA

PREPARED BY
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH – GIS BRANCH
IN COORDINATION WITH THE
U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

FIGURE 2-1

During the environmental analysis of a project its impact on the physical, social/culteral, and economic environment are considered. The cost/benefit analysis looks at many of these. The environmental analysis, though, looks more specifically at: (1) air quality; (2) water resources; (3) soils and geology; (4) wildlife; (5) vegetation; (6) neighborhoods; (7) noise; (8) educational and religious facilities; (9) parks and recreational facilities; (10) landmarks and historic sites; and (11) public health and safety. The net impact of both the positive and negative probabilities provides a measure of the relative environmental impact of a project.

Table 2-1 lists the major unfunded Cabarrus-South Rowan Urban Area Thoroughfare Plan projects with respect to estimated costs, user benefits, probability of economic development, and environmental impacts. Counter to any benefits derived from building a project, though, is the cost of constructing it. The highway construction costs reported in Table 2-1 are based on the average statewide construction cost for similar projects in 1994 dollars. The estimate of anticipated right-of-way costs are also based on those used in similar projects in the area. Appendix F contains any comments or environmental notes for each project.

Table 2-1 - Cost Estimates and Benefits Analysis

SECTION	TYPE OF IMPRV	DIST		1994 CONST COSTS ($1000)	1994 ROW COSTS ($1000)	USER BENEFITS ($1000)	POS ECON IMPACT	APPENDIX F ENVIRONMENTAL IMPACTS		
		km	mi					POS	NEG	NOTES
AIRPORT RD-HOMER CORRIHER RD										
Cannon Farm Rd -- West A St	NL*	1.63	1.02	2,024	180	10,754	.56	.20	.20	1, p. F-1
ALEXANDER AV										
Robinson Church Rd -- NC 49	NL&W	1.23	0.77	2,022	1,147	31,121	.60	.20	.30	2, p. F-1
BLACKWELDER Rd (SR 1307)										
Roberta Rd -- NC 49	W	1.91	1.20	970	557	16,394	.30	.20	.25	3, p. F-1
BROOKWOOD AV										
Church St -- McGill St	NL	1.48	0.93	8,397	1,136	52,609	.40	.25	.30	4, p. F-1
CABARRUS AV (SR 1002)										
Corban Av -- NC 136	W	2.74	1.72	2,372	6,538	26,353	.30	.25	.35	5, p. F-1
CALDWELL RD (SR 1173)										
NC 49 -- US 29	NL	3.67	2.30	3,626	447	64,663	.70	.25	.25	6, p. F-1
COLDWATER CONNECTOR & CRESTMONT DR										
Copperfield Blvd -- US 601	NL&W	13.0	8.12	14,316	2,984	441,588	.60	.20	.25	7, p. F-1
DAKOTA ST										
Westside Conn -- Dale Earnhardt Blvd	NL&W	6.84	4.29	26,982	1,803	98,368	.70	.25	.30	8, p. F-1
DERITA RD (SR 1445)										
Poplar Tent Rd -- Kings Grant Blvd	W	4.31	2.70	4,927	421	57,436	.60	.25	.30	9, p. F-1
Kings Grant Blvd -- Meck Co	W	0.16	0.10	393	237	1,878	.50	.20	.10	10, p. F-2
DOGWOOD BLVD (SR 1838)										
Westside Conn -- Rogers Lake Rd	NL	1.75	1.10	1,706	437	6,783	.60	.25	.25	11, p. F-2

* W-widening NL-new location NL&W-new location & widening

Table 2-1 - Cost Estimates and Benefits Analysis

SECTION	TYPE OF IMPRV	DIST		1994 CONST COSTS ($1000)	1994 ROW COSTS ($1000)	USER BENEFITS ($1000)	POS ECON IMPACT	ENVIRONMENTAL IMPACTS		
		km	mi					POS	NEG	NOTES
EVELYN ST Ebeneezer Rd -- Moose Rd	NL	1.52	0.95	1,963	794	47,029	.40	.20	.25	12, p. F-2
FLOWES STORE RD (SR 1132) US 601 -- Zion Church Rd	W	4.77	2.99	4,117	716	4,227	.50	.20	.25	13, p. F-2
INDUSTRIAL PARK RD End -- Stallings Rd	NL	0.32	0.20	384	67	26,443	.40	.20	.20	14, p. F-2
INTERSTATE 85 NC 152 -- Meck Co	W	29.7	18.6	153,916	0	946,288	.60	.20	.20	15, p. F-2
KIMBALL RD (SR 1211) Main St -- US 29	NL	1.27	0.78	13,965	457	5,419	.70	.20	.20	16, p. F-2
LENTZ-NC 152 CONNECTOR Lentz -- NC 152	NL	1.05	0.66	1,034	509	30,293	.40	.15	.15	17, p. F-2
LOOP-JACKSON PARK-LANE ST I-85 -- Old Salisbury Rd	W	2.52	1.58	2,486	346	6,324	.30	.20	.20	18, p. F-2
MALL RD US 29 -- NC 136	NL	1.96	1.23	1,543	1,160	50,354	.50	.20	.10	19, p. F-2
MCGILL ST Brookwood Ext -- Church St	W	1.24	0.78	938	4,903	138	.30	.15	.25	20, p. F-2
MOREHEAD RD (SR 1300) NC 49 -- Mallard Creek	W	1.55	0.97	1,385	1,607	64	.40	.20	.25	21, p. F-3

* W-widening NL-new location NL&W-new location & widening

Table 2-1 - Cost Estimates and Benefits Analysis

SECTION	TYPE OF IMPRV	DIST		1994 CONST COSTS ($1000)	1994 ROW COSTS ($1000)	USER BENEFITS ($1000)	POS ECON IMPACT	ENVIRONMENTAL IMPACTS		
		km	mi					POS	NEG	NOTES
MT MORIAH CHURCH-NC 152 CONNECTOR										
Mt Moriah Church Rd -- NC 152	NL	2.26	1.42	3,441	1,405	18,130	.50	.20	.25	22, p. F-3
NC 73										
Meck Co -- US 29	W	14.8	9.31	17,739	5,527	129,931	.40	.20	.35	23, p. F-3
Church St -- NC 136	W	0.93	0.58	1,202	5,792	13,871	.40	.20	.25	24, p. F-3
NC 136										
Iredell Co -- Westside Conn	W	10.8	6.76	8,370	1,350	30,994	.40	.20	.25	25, p. F-3
Dale Earnhardt Blvd -- NC 73	W	8.21	5.15	11,004	2,890	197,114	.50	.20	.20	26, p. F-3
NC 152										
Church St -- Shue Rd	NL	2.55	1.60	4,793	628	20,060	.70	.20	.25	27, p. F-3
US 29 -- I-85	W	3.05	1.91	2,819	953	14,337	.40	.20	.20	28, p. F-3
NORTHERN CORRIDOR										
Morehead Rd -- NC 49	NL	2.92	1.83	3,053	432	17,948	.50	.25	.25	29, p. F-3
ODELL SCHOOL RD (SR 1442)										
NC 73 -- Poplar Tent Rd	W	4.26	2.67	4,740	1,262	3,263	.60	.20	.30	30, p. F-4
OLD CHARLOTTE RD (SR 1335,1157)										
US 601 -- Roberta Rd	W	0.54	0.34	660	1,584	16,484	.40	.20	.20	31, p. F-4
Roberta Rd -- NC 49	W	2.63	1.65	2,594	1,844	9,382	.40	.20	.30	32, p. F-4
PITT SCHOOL RD (SR 1305)										
Shelton Rd -- Roberta Rd	W	9.15	5.74	9,029	1,210	12,795	.50	.20	.30	33, p. F-4
POPLAR TENT RD (SR 1394)										
Meck Co -- Derita Rd	W	5.33	3.34	6,783	515	5,327	.50	.25	.25	34, p. F-4
Derita Rd -- US 29	W	9.09	5.70	13,985	3,194	234,272	.60	.20	.25	35, p. F-4

* W-widening NL-new location NL&W-new location & widening

Table 2-1 - Cost Estimates and Benefits Analysis

SECTION	TYPE OF IMPRV	DIST		1994 CONST COSTS ($1000)	1994 ROW COSTS ($1000)	USER BENEFITS ($1000)	POS ECON IMPACT	ENVIRONMENTAL IMPACTS		
		km	mi					POS	NEG	NOTES
ROBERTA RD (SR 1304)										
Old Charlotte Rd -- NC 49	W	9.00	5.64	11,621	6,468	97,834	.40	.25	.30	36, p. F-4
ROCKY RIVER RD (SR 1139)										
NC 49 -- Meck Co	W	12.5	7.86	12,523	2,379	146,868	.50	.20	.20	37, p. F-4
SOUTHERN CORRIDOR										
NC 49 -- Robinson Church Rd	NL	2.54	1.59	2,502	593	64,578	.60	.20	.25	38, p. F-5
STALLINGS RD (SR 1161)										
Alexander Dr -- Robinson Church Rd	NL	0.38	0.24	468	339	31,681	.60	.20	.25	39, p. F-5
Robinson Church Rd -- Rocky River Rd	W	4.45	2.79	3,399	2,250	863	.50	.20	.25	40, p. F-5
TRINITY CHURCH RD (SR 1622)										
Westside Conn -- NC 73	W	2.12	1.33	2,832	690	3,655	.40	.25	.25	41, p. F-5
UNION ST (US 601 BUS)										
NC 136 -- US 601	W	0.81	0.51	738	1,784	1,904	.50	.20	.20	42, p. F-5
US 29 (CANNON BLVD)										
Church St -- Cabarrus Av	W	5.01	3.14	5,424	1,539	196,422	.60	.25	.20	43, p. F-5
Cabarrus Av -- Rocky River	W	7.43	4.66	11,022	1,776	34,652	.60	.20	.25	44, p. F-5
US 601										
Cabarrus Av -- Union St	W	5.79	3.63	7,291	1,222	105,587	.50	.20	.25	45, p. F-5
Union St -- Flowes Store Rd	W	1.87	1.17	3,384	994	257,069	.40	.20	.20	46, p. F-5
Flowes Store Rd -- PAB	W	2.46	1.54	3,927	1,030	32,775	.40	.20	.25	47, p. F-5

* W-widening NL-new location NL&W-new location & widening

Table 2-1 - Cost Estimates and Benefits Analysis

SECTION	TYPE OF IMPRV	DIST		1994 CONST COSTS ($1000)	1994 ROW COSTS ($1000)	USER BENEFITS ($1000)	POS ECON IMPACT	ENVIRONMENTAL IMPACTS		
		km	mi					POS	NEG	NOTES
WEDDINGTON RD (SR 1431)										
Speedway Blvd -- Pitts School Rd	NL	2.79	1.75	8,115	148	241,674	.70	.25	.25	48, p. F-6
Pitts School Rd -- Rock Hill Ch Rd	W	6.19	3.88	7,751	443	15,274	.40	.20	.20	49, p. F-6
Rock Hill Church Rd -- US 29	NL	1.66	1.04	2,142	912	25,578	.50	.20	.20	50, p. F-6
WEST C ST (SR 1124,1680)										
Westside Conn -- Enochville Av	NL	0.67	0.42	816	170	21,717	.60	.20	.25	51, p. F-6
Enochville Av -- Loop Rd	W	3.89	2.44	3,033	1,007	6,421	.50	.25	.25	52, p. F-6
WESTSIDE CONNECTOR										
Tuckaseegee Rd -- PAB	NL&W	8.39	5.26	17,190	3,418	59,543	.70	.20	.25	53, p. F-6
WILSHIRE RD (SR 1157)										
Old Charlotte Rd -- Union St	W	3.68	2.31	4,339	5,355	6,324	.40	.20	.25	54, p. F-6
Union St -- NC 136	NL	1.23	0.77	2,319	397	5,121	.30	.20	.25	55, p. F-6
WRIGHT RD (SR 1359,1363)										
Mill Creek -- Westside Connector	NL	1.63	1.02	1,888	908	21,717	.50	.20	.25	56, p. F-6
ZION CHURCH RD (SR 1482,1155,1152)										
US 601 -- Flowes Store Rd	W	7.61	4.77	7,576	3,622	7,527	.50	.20	.20	57, p. F-6

* W-widening NL-new location NL&W-new location & widening

III. IMPLEMENTATION

A major part of implementing a thoroughfare plan lies in the initiative of the municipalities for whom the plan was formulated. There are several tools available to municipalities for the implementation of their thoroughfare plan. Effective use of the available tools indicates good planning on the part of a municipality. Unless implementation of a plan is carried out the effort and expense of doing a plan is lost. There is the loss of capital expenditures and the associated opportunities. Most importantly there is the loss of the benefits of an improved transportation system.

A. STATE-MUNICIPAL ADOPTION OF THE THOROUGHFARE PLAN

Chapter 136, Article 3A, Section 136-66.2 of the General Statutes of North Carolina provides that after development of the thoroughfare plan the plan may be adopted by the governing body of the municipality and the Board of Transportation as the basis for future street and highway improvements.

The General Statutes also require that, as part of the plan, the governing body of the municipality and the Department of Transportation shall reach an agreement on the responsibility for both existing and proposed streets and highways included in the plan. The General Statutes stipulate that the Department of Transportation shall be responsible for those facilities which serve major volumes of through traffic and traffic from outside the planning area to major business, industrial, governmental, and institutional destinations located inside the municipality. The municipality is responsible for those facilities which serve primarily internal travel. Facilities which are designated as State responsibility shall be constructed and maintained by the Division of Highways. Facilities designated as municipal responsibility shall be constructed and maintained by the municipality. Chapter 136, Article 3A, Section 136-66.1 of the General Statutes provides guidance for the delineation of responsibility for the roads on the thoroughfare plan.

Mutual adoption of the Thoroughfare Plan lets officials use other planning tools available to them for implementation of the plan. These include: Town funding, Federal revenue sharing or block grants, urban bonds, redevelopment, zoning ordinances, advance purchase of rights-of-way, subdivision ordinances, future street line ordinances, official street maps, and lobbying for state construction.

B. HIGHWAY TRUST FUND LAW

In 1989 the General Assembly passed a law establishing the Highway Trust Fund. Some goals of the Trust Fund are: to complete the designated four-lane Intrastate System, construct multi-lane urban loop and connector roads around designated cities, supplement the secondary roads appropriation to pave all the unpaved state-maintained secondary roads, and supplement the Powell Bill program.

C. TRANSPORTATION IMPROVEMENT PROGRAM

Every year, in the fall, the North Carolina Department of Transportation holds public hearings in each of its fourteen divisions to gather local input for compilation of the State Transportation Improvement Program (TIP) on which the state will spend its money during the next fiscal year. That is the time for a municipality to lobby for any project on their thoroughfare plan to be included in the state TIP. Projects are grouped into highway, rail, aviation, bicycle program, public safety, public transit, and more recently, congestion management projects.

D. CONGESTION MANAGEMENT SYSTEM (CMS)

Dealing with the problem of congestion on our transportation systems is one of the major challenges for transportation professionals today. Trends in transportation policy, funding, and impacts have forced transportation professionals to find new and innovative ways to deal with congestion. One of these ways is the Congestion Management System.

The Federal law (23 CFR 450.320(b)) concerning CMS states that **all identified reasonable travel demand reduction and operational management strategies shall be incorporated into a single occupancy vehicle project or committed to by the State and MPO for implementation.** See Appendix A for a discussion of operational management strategies.

CMS is a process that provides information on transportation system performance and presents alternative strategies to alleviate congestion and enhance the mobility of people and goods. It includes methods to monitor and evaluate performance, identify alternative actions, assess and implement cost effective actions, and evaluate the effectiveness of those actions.

The Cabarrus-South Rowan Urban Area has prepared an action plan for their CMS. They have identified congested areas, and are currently developing improvement strategies. Like the transportation plan itself this CMS plan will be periodically re-examined to measure the effectiveness of planned improvements.

E. LOCAL SUBDIVISION CONTROLS

A subdivision ordinance requires that every subdivider submit a plat of his proposed subdivision to the local Planning Commission. Certain standards set by the Commission must be met by the developer before a building permit can be issued for construction of a development. By using this process it is possible to reserve or protect the necessary right-of-way needed for future street construction in accordance with the adopted Thoroughfare Plan.

F. LOCAL ZONING REGULATIONS

Like subdivision ordinances zoning can be used to plan future traffic patterns because they provide a degree of stability to the development on which those patterns are based. Good zoning also

establishes a standard for development which will aid traffic operations on major thoroughfares and help minimize the strip commercial development along major thoroughfares which causes traffic friction and reduces traffic safety.

G. DEVELOPMENT REVIEWS

Permit requests for driveway access to a state-maintained street or highway are reviewed by the District Engineer's office and the Traffic Engineering Branch of the Department of Transportation. Any development expected to generate large volumes of traffic (e.g. shopping centers, fast food restaurants, large industries, etc.) may be comprehensively studied. If this is done early in the process it is often possible to significantly improve the development's accessibility at minimal expense. Since the municipality is often the first point of contact for developers it is important that the municipality advise them of this review requirement and cooperate in the review.

H. OFFICIAL STREET MAP

A municipality may, through special enabling legislation, adopt an Official Street Map which indicates existing or future street lines. No new construction or reconstruction of structures would be permitted within the designated lines. These restrictions are in the form of a prohibition, for up to three years, on the issuance of building permits or the approval of subdivisions on property lying within the designated alignment. The three year reservation period begins with the request for development approval. This would, over a period of time, reduce the cost of additional right-of-way along densely developed thoroughfares which will require widening at some future date.

Future street lines should be established to provide for the ultimate right-of-way specified in Appendix C. The proposed corridors are not final in regard to spending of Federal-aid funds until an Environmental Assessment or Environmental Impact Statement has been completed, thus there is some risk in reserving the corridor. This risk, however, is minimal compared to the savings in both costs and disruption to the community by planning for the facilities up front.

The Program and Policy Branch of the North Carolina Department of Transportation is responsible for organizing the adoption of Official Street Maps. Cities considering Official Street Map projects should contact this Branch for their guidelines at:

Program Development Branch
NC Department of Transportation
P.O. Box 25201
Raleigh, North Carolina 27611

I. FUTURE STREET LINE ORDINANCES

Similar to the Official Street Map legislation this ordinance can be used mainly where widening of an existing street may be necessary sometime in the future. A municipality, with

legislative approval, may amend its charter to be empowered to adopt any future street line ordinances. Through a metes-and-bounds description of a street's future right-of-way requirements the Town may prohibit new construction or reconstruction of structures within the future right-of-way. This approach requires specific design of the facility and would usually require surveys and public hearings to let affected property owners know what to expect and to make necessary adjustments without undo hardship. A specific ordinance can be enacted for selected streets. Whereas an Official Street Map is only good until an official federal environmental study is completed a future street line ordinance is good for an indeterminate period of time.

J. POWELL BILL AND HOUSE BILL 1211

Chapter 136, Article 41, Section 3 of the General Statutes, or the Powell Bill, directs that "the funds allocated to the cities and towns...shall be expended...for the purpose of maintaining, repairing, constructing, reconstructing or widening of any street or public thoroughfare including bridges, drainage, curb and gutter, and other necessary appurtenances within the corporate limits...or for meeting the municipality's proportionate share of assessments levied for such purposes, or for the planning, construction and maintenance of bikeways located within the rights-of-way of public streets and highways."

This includes the acquisition of right-of-way. House Bill 1211 set maximum percentage rates for participation by the municipalities in the purchase or acquisition of right-of-way for a project. The exact amount is dependant upon the municipality's willingness to pay, its ability to pay, and its willingness to acquire right-of-way on its own in anticipation of the project being completed.

The cost of purchasing the right-of-way is usually the highest percentage of the total cost of a project and quite often the hardest to plan for. Sometimes the high cost of right-of-way for a project could eliminate it completely from consideration. That is why protection or donation of rights-of-way is an excellent way to conserve the money available for highway construction. There are several methods municipalities can use to acquire rights-of-way for projects on their thoroughfare plan.

K. HOUSE BILL 815, CHAPTER 478

This bill lets Cabarrus County purchase right-of-way for highway projects for construction by both cities and the State. Previously the County could only receive donated or dedicated land.

L. CAPITAL IMPROVEMENT PROGRAM

Another tool which makes it easier to construct a planned thoroughfare system is a municipal capital improvement program. This is a long-range, coordinated plan for spending money on municipal street construction or improvements, acquisition or cost sharing of rights-of-way, or any other capital improvements within the bounds of projected municipal revenues.

M. REDEVELOPMENT

This term describes efforts toward the removal or rehabilitation of deteriorated, abandoned or otherwise undesirable development. It is one of the few tools available to correct basic mistakes in the street system such as poor design and layout of a street or just too many streets built in one area.

N. MUNICIPAL SERVICE DISTRICTS

Under Chapter 160A, Sections 535-543 of the General Statutes, the legislative body of a municipality may create one of more municipal service districts in a downtown commercial area in order to raise additional funds for physical improvements. One of the stipulated purposes of the district is to facilitate traffic flow and parking. The district may float a bond issue which would be paid off with revenues from an extra ad valorem tax on all property within the district's boundaries. Once the improvements have been completed and the bonds retired, the extra tax would cease and the district would dissolve.

O. DETAILING OF THE PLAN

For the proper administration of subdivision regulations and to obtain more accurate cost estimates of proposed facilities, it would be desirable that the plan be detailed to the extent that preliminary designs of proposed facilities are delineated on topographic mapping of a horizontal scale of 1" = 100' or 1" = 200'. Such preliminary design would more fully indicate the nature of proposed improvements, right-of-way needs, and the effect of proposed improvements on adjacent properties. This detailing of the plan could be accomplished by a consultant employed by the Municipalities.

P. OTHER FUNDING SOURCES

User impact fees, or called facility fees in the legislation, should be based on "reasonable and uniform considerations of capital costs to be incurred by the city or town as a result of new construction. The facility fee must bear a direct relationship to additional or expanded public capital costs of the community service facilities to be rendered for the inhabitants, occupants of the new construction, or those associated with the development process."

A bond issue or special assessment for street improvements, Federal Demonstration Project funds that could be used for qualified projects, and an adopted collector street plan that would assess property buyers or owners are all viable sources of revenue.

IV. ANALYSIS OF ALTERNATIVES

The fundamental function of transportation planning is the ability to test and analyze different highway configurations and their efficiency in serving an area as it grows. This process should evaluate existing conditions, past efforts to eliminate deficiencies in the network, and if possible propose more appropriate improvements given expected land use.

The process of developing and evaluating alternative plans involves a number of considerations. These can include considering local goals and objectives, existing and anticipated land uses, and travel service. The location and severity of traffic accidents, capacity deficiencies, and potential environmental impacts should also be considered. Table 4-2 shows the results of the air quality analysis on the last three alternatives.

Capacity deficiency analysis is a useful technique for judging a system's efficiency. Appendix H contains an explanation of the different Levels of Service of a road and the "practical capacity" of certain facilities at Level of Service D. Level of Service D was used to investigate capacity deficiencies on each of the plan alternatives.

A. DO-NOTHING ALTERNATIVE

Not implementing elements of a transportation plan would be called a do-nothing alternative. This means that there would be no new construction or other improvements except routine maintenance. Some of the major advantages of doing nothing include:

1. No capital investment cost.
2. No construction traffic disruption.
3. No noise, air or water pollution due to construction.
4. No removal of shrubs or trees.
5. No additional land aquisition.
6. No displacement of people or businesses as a result of construction.

There are, however, several disadvantages to a "do-nothing" policy which would have significant adverse consequences for the urban environment. These include:

1. Increasing traffic volumes and congestion on major streets, which will cause traffic to divert to residential streets.
2. Existing "bottleneck" situations will bvecome even worse.
3. Social, health and safety standards will deteriorate.
4. Increased road user costs.
5. Increased driving time.
6. Increased accidents.
7. Increased air and noise pollution induced by traffic congestion.
8. Reduced mobility for emergency vehicles.
9. Increased transport costs for businesses.
10. Reduced retail sales due to increased congestion, reduced accessibility, and higher transport costs.

11. Increased driver and public frustration due to congestion.

The "do-nothing" concept, while an alternative, is not one actively encouraged by most planners because of its great number of negative impacts on an area. Figure 4-1 illustrates future implications of the "do-nothing" alternative on the existing system.

B. EXISTING PLUS COMMITTED STREET SYSTEM ALTERNATIVE

This alternative consists of the existing street network, or those streets that exist now, plus those major projects appearing in the FY1996-2002 State Transportation Improvement Program (TIP) that would affect traffic flows. Those projects are listed in Table 4-1. The addition of a project to the TIP represents only a commitment to provide improvements. Detailed project studies and environmental impact statements, that include public participation, must be performed so the best improvement can be determined for each project. Figure 4-2 shows this alternative graphically and the capacity deficiencies that may occur with design year 2020 traffic traveling on it.

Table 4-1
Scheduled Highway Improvement Projects*

Project		Schedule		Estimated
TIP #	Description	ROW	Construction	Cost($1000)
R-2215	NC 49 Widening	Complete	ends FY97	12050
R-2533	NC 49 Widening	FY96	FY98	58700
R-2410	NC 73 Widening	FY02	Post Year	37500
R-2246	Westside Conn	FY00	FY02	19800
R-2315	Kings Grant	Complete	ends FY97	10570
U-530	NC 136 Ext	Complete	ends FY96	7864
U-3115	US 29 Widening	ends FY96	FY96	10725
U-2009	Westside Conn	FY96	FY98	24605
U-2833	Earnhart Road	FY98	FY00	6200
U-3440	NC 136	FY02	Post Year	7000
B-3039	NC 152 @ US 29	FY99	FY00	715
I-2511	I-85 Widening	ends FY99	FY97	135451
W-2813	NC 152	complete	FY96	175

* From FY 1996-2002 TIP. Schedules change yearly.

This analysis revealed future problem areas that must be addressed beyond what is already programmed. It is also helpful in determining how well the currently programmed projects help alleviate the traffic problems for which they were designed.

C. EXPANDED EXISTING THOROUGHFARE PLAN ALTERNATIVE

As mentioned in the introduction, several projects from the 1988 Transportation Plan have have been or are being implemented. However, many things have changed since the 1988 Plan was adopted--the design year has been extended from 2005 to 2020, and the planning boundary has been expanded considerably to allow for expected urban development during that time. The Town of

Harrisburg was brought into the transportation planning process in the area, but after the computer model was developed. A thoroughfare plan for Harrisburg was adopted in 1990 and that plan was "folded" into the existing 1988 Cabarrus-South Rowan Plan.

Design year 2020 traffic was assigned to the existing 1988 plan and the current existing plus committed street system to determine what deficiencies might occur with an additional fifteen years of growth. The projected volumes were compared to the expected capacity of each road on the network and each proposed improvement, both programmed and recommended, were evaluated. Figure 4-3 shows the results of the analysis.

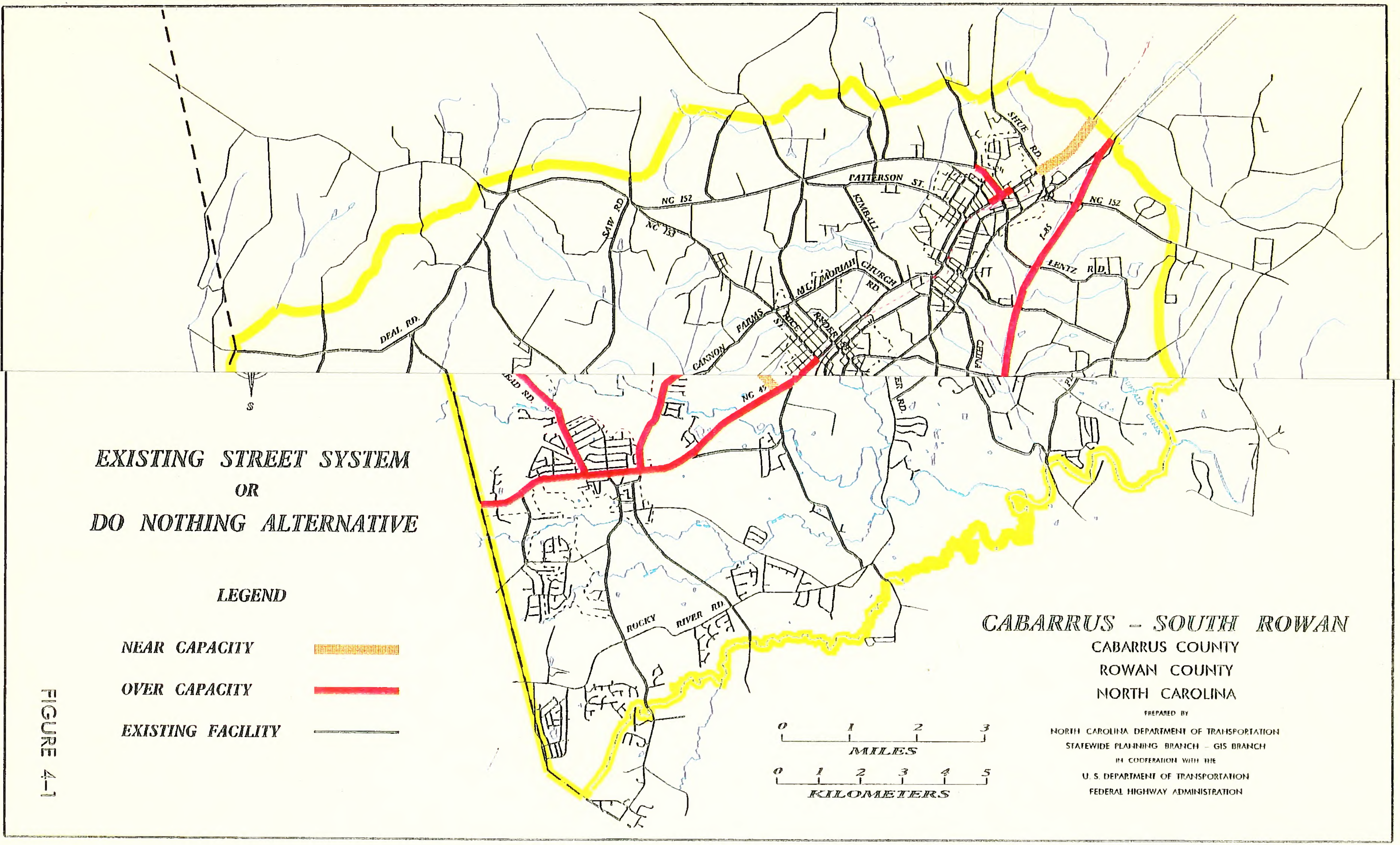
D. RECOMMENDED PLAN ALTERNATIVE

This last alternative is a combination of: the existing plus committed alternative; parts of the 1988 Thoroughfare Plan alternative; results of an environmental review; and suggestions extracted from comments made by local officials, staff, and the public (See Appendix E). The results of the analysis of this alternative are discussed in detail in Chapter two.

Table 4-2
2020 Air Quality Analysis
of Alternative Plans*

Alter-native	Daily VMT (mi)	Carbon Monoxide (CO)	Nitric Oxides (NOx)	Hydro-Carbons (VOC)
E+C	5603268	103067	13578	7007
ETP	5590125	103374	13533	7023
TP	5605498	103186	13528	7029

* No emissions factors have been developed for the Cabarrus-South Rowan Area so factors from the Charlotte Area were used. The results are not actual but for comparison purposes only.


EXISTING STREET SYSTEM
OR
DO NOTHING ALTERNATIVE
LEGEND
NEAR CAPACITY
OVER CAPACITY
EXISTING FACILITY
CABARRUS - SOUTH ROWAN
CABARRUS COUNTY
ROWAN COUNTY
NORTH CAROLINA
PREPARED BY
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH - GIS BRANCH
IN COOPERATION WITH THE
U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
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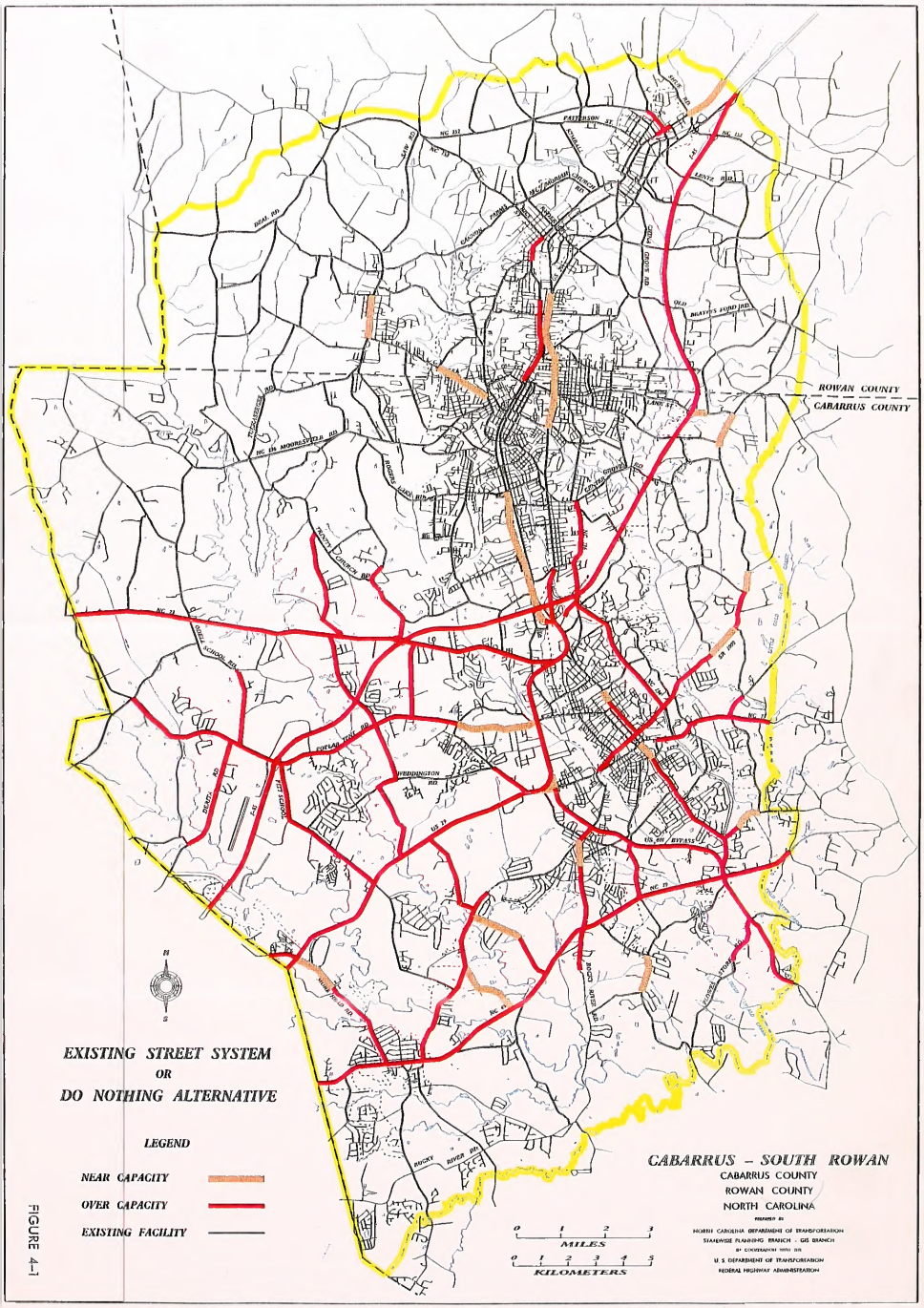
MILES
0 1 2 3 4 5
KILOMETERS
PATTERSON ST.
NC 152
NC 153
SAW RD.
KIMBALL
MT. MORIAH CHURCH RD.
SHUE RD.
I-85
LENTZ RD.
CHINA
DEAL RD.
CANNON
FARMS
RIDER
NC 47
ROCKY RIVER RD
S

FIGURE 4-1


ROWAN COUNTY
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EXISTING STREET SYSTEM
OR
DO NOTHING ALTERNATIVE
LEGEND
NEAR CAPACITY
OVER CAPACITY
EXISTING FACILITY
CABARRUS – SOUTH ROWAN
CABARRUS COUNTY
ROWAN COUNTY
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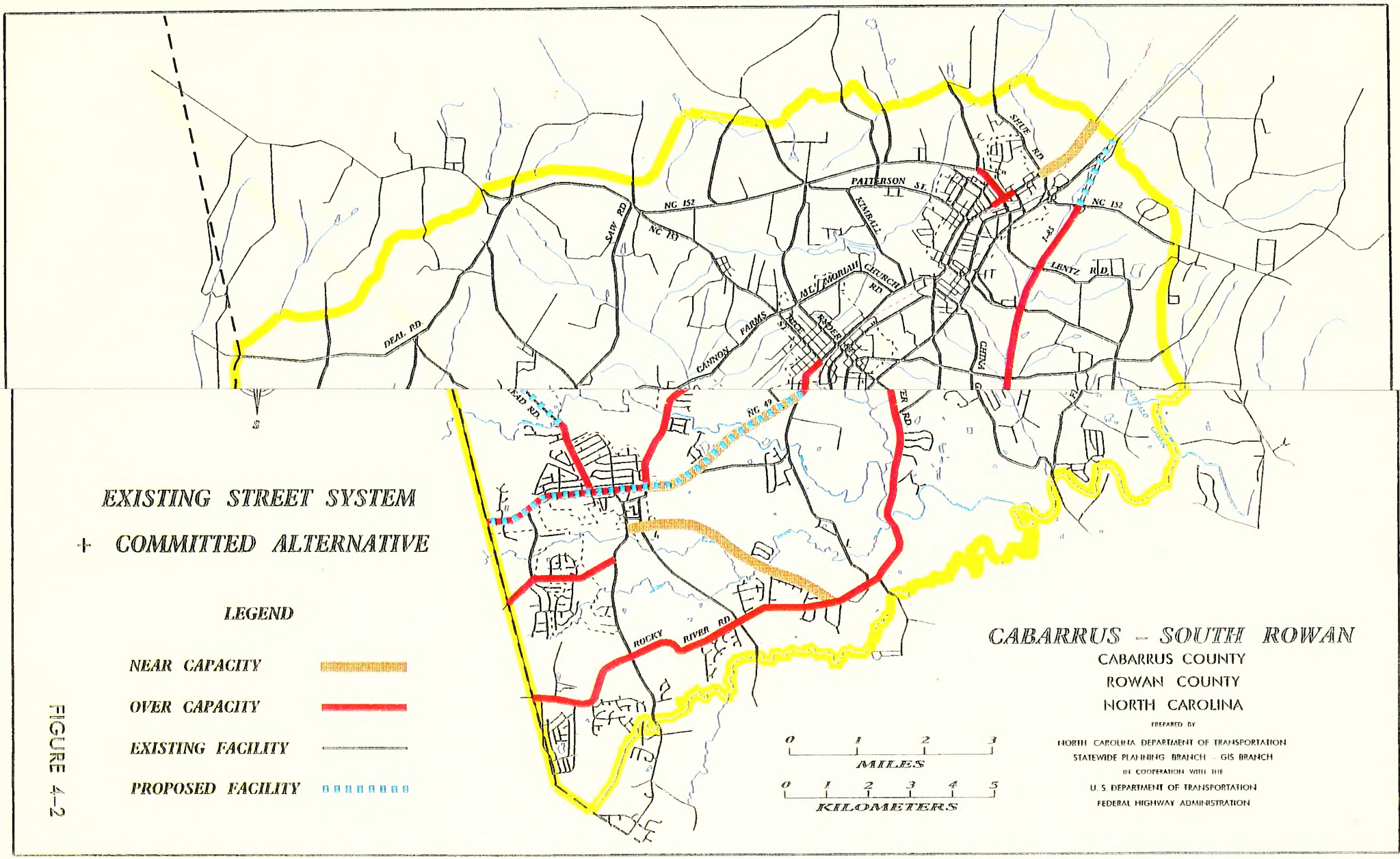
BY COOPERATION WITH THE
U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
0 1 2 3
MILES
0 1 2 3 4 5
KILOMETERS

FIGURE 4-1


EXISTING STREET SYSTEM
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LEGEND
NEAR CAPACITY
OVER CAPACITY
EXISTING FACILITY
PROPOSED FACILITY
CABARRUS - SOUTH ROWAN
CABARRUS COUNTY
ROWAN COUNTY
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U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
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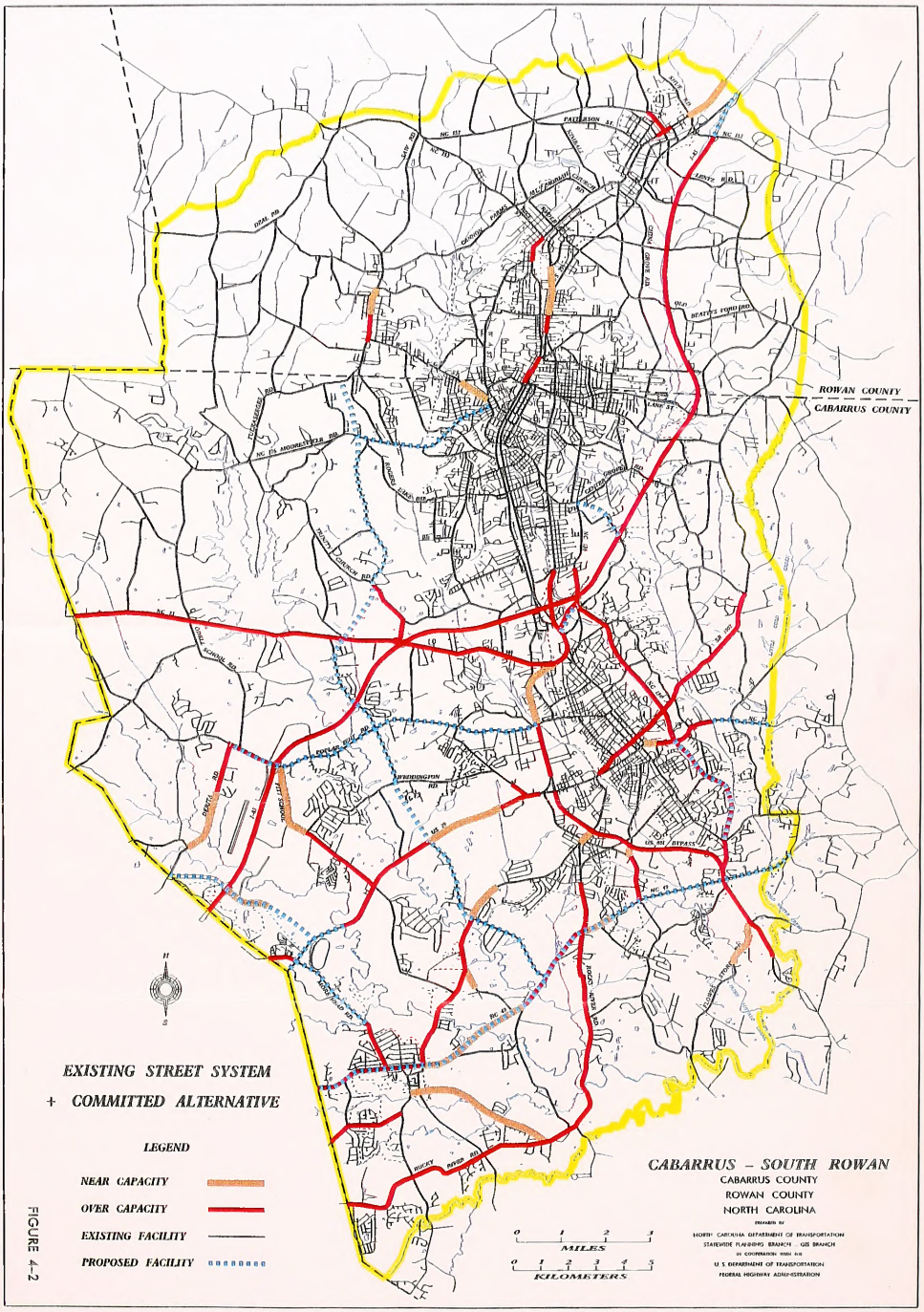
MILES
0 1 2 3 4 5
KILOMETERS
PATTERSON ST.
NC 152
NC 153
SAW RD
DEAL RD
KIMBALL
SHUE RD
LENTZ RD
I-85
CANNON FARMS
ROCKY RIVER RD
NC 49
LEAD RD

FIGURE 4-2


ROWAN COUNTY
CABARRUS COUNTY
EXISTING STREET SYSTEM
+ COMMITTED ALTERNATIVE
LEGEND
NEAR CAPACITY
OVER CAPACITY
EXISTING FACILITY
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U.S. DEPARTMENT OF TRANSPORTATION
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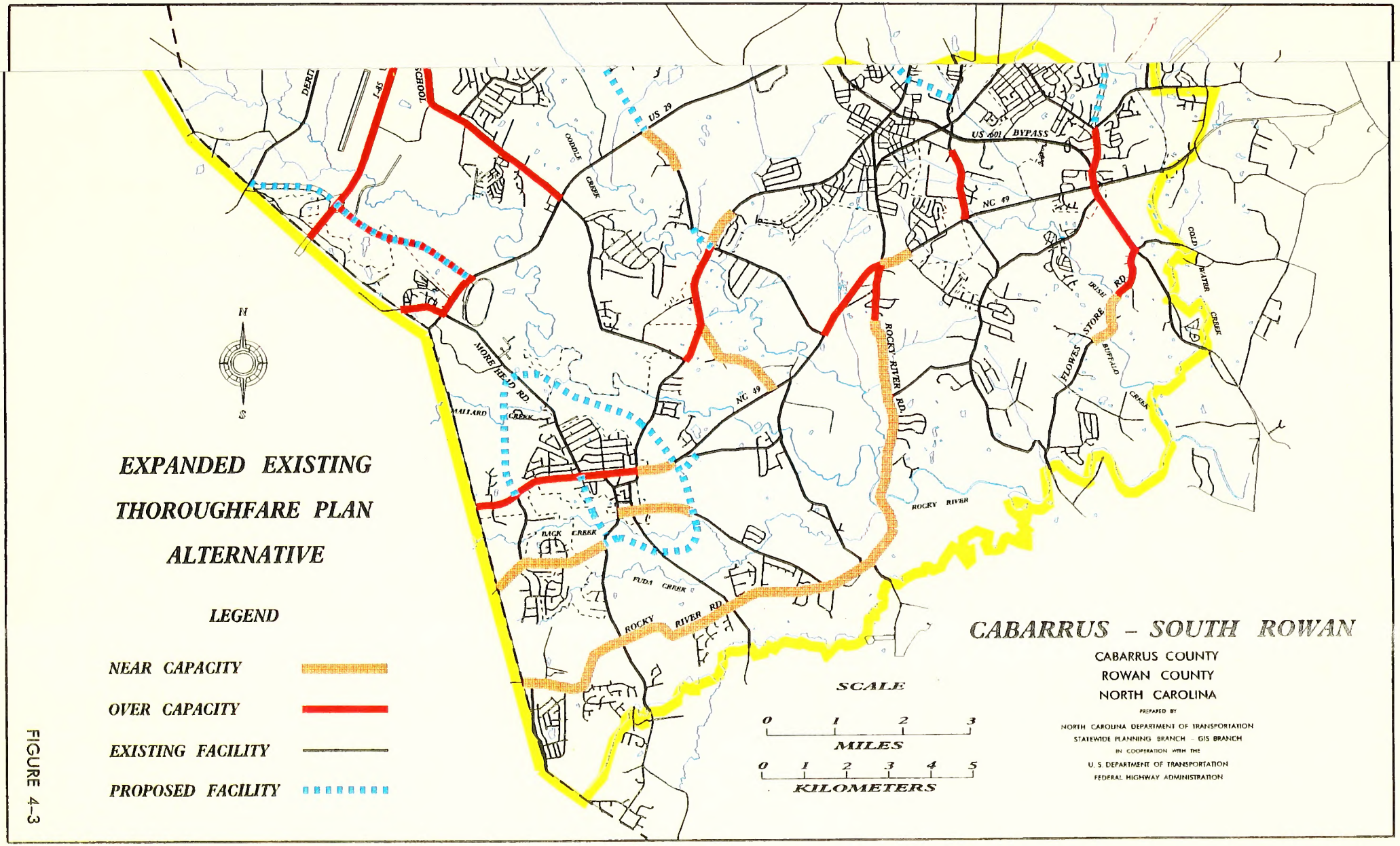
FIGURE 4-2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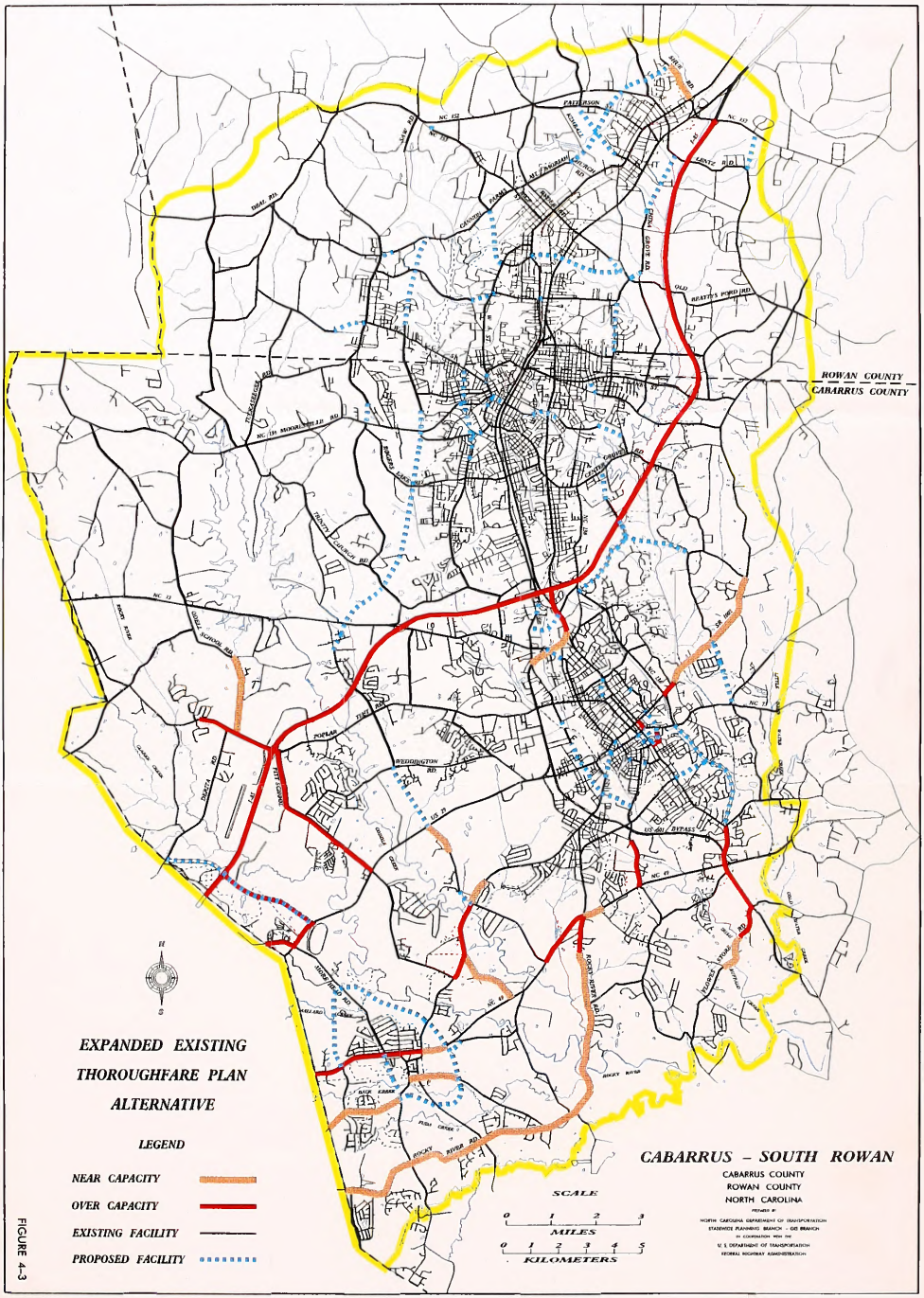
CABARRUS – SOUTH ROWAN
CABARRUS COUNTY
ROWAN COUNTY
NORTH CAROLINA
PREPARED BY
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH – GIS BRANCH
IN COOPERATION WITH THE
U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
US 29
US 601 BYPASS
NC 49
ROCKY RIVER RD.
MOREHEAD RD.
FUDA CREEK
BACK CREEK
MAILARD CREEK
COLD WATER CREEK
IRISH STORE RD.
FLOWES BIFFLE CREEK
ROCKY RIVER

FIGURE 4-3


ROWAN COUNTY
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CABARRUS – SOUTH ROWAN
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IN COOPERATION WITH THE
U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

FIGURE 4-3

V. EXISTING POPULATION, LAND USE, AND TRAFFIC

A. SOCIOECONOMIC TRENDS - PEOPLE AND GOODS

Travel is directly related to population, employment, and economic vitality of an area. A change in one or more of these factors can dramatically affect the amount of travel on a single road or a whole system of roads. Additional factors may include subdivision regulations, zoning ordinances, availability of public utilities, or physical features of the area. The factors of population, vehicle usage trends, economy, and land use play a significant role in determining the transportation needs of an area. To develop an adequate transportation plan reliable forecasts of future travel characteristics must be achieved.

B. POPULATION

Travel in an area is directly related to the population in an area. The volume of traffic on any given section of roadway is closely related to the size and distribution of the population which it serves. Because of this relationship, one of the basic steps in planning a transportation system is an in-depth population study. Population trends for the two counties and the state during the previous thirty years and the future years for the last three planning studies are in Table 5-1.

Table 5-1
Annual Population Trends

Year	North Carolina*	Cabarrus*	Rowan*	Area
1960	4556155	68137	82817	
1970	5084411	74629	90035	
1980	5880095	85895	99186	
1990	6628637	98935	110605	
%chg	1.26	1.25	0.97	---
1993	n/a	n/a	n/a	77305
1995	7031893	106068	116607	n/a
2000	7399683	112802	122268	n/a
2005	7737342	119027	127446	n/a
2020	8727295	133072	n/a	131951
%chg	0.87	0.91	0.89	2.00

* Source: N.C. Data Center

C. ECONOMY AND EMPLOYMENT

The percentage of the population that will be working in the future depends on the types of employers in the area and how eager and successful local officials are in bringing in new ones. For 1993 about 39% of the population in the planning area was working. In the future year it is expected that 54% of the planning area population will be employed. Base and future year employment for each of the five classifications is shown in Table 5-2.

Table 5-2 Employment			
Classification	1993	2020	%chg
Industrial	14529	26669	2.27
Retail	4529	7369	1.82
Highway Retail	2445	8261	4.61
Office & Institution	2882	13085	5.76
Service	5408	15870	4.07
Total	30189	71254	3.23

D. LAND USE AND TRAVEL PATTERNS

The number of trips produced by a particular segment of land in an urban area is related to the way the land is used or developed. Some land uses generate more trips than others. High trip generators grouped together around one intersection or along one stretch of road can increase congestion there. The population, availability of land, utilities and transportation facilities, topography, and the effectiveness of legal and regulatory controls all have an effect on land use.

The Cabarrus-South Rowan area street systems and travel patterns are dominated by three things--the close proximity to the much larger Charlotte metropolitan area; the north-south alignment of I-85, US 29, and Main Street cutting through the center of the area; and the location and continued use of the rail corridor.

The Charlotte area has experienced phenomenal growth over the last few years. This growth has spread into Cabarrus and Rowan Counties, but commuter studies show the major draw in the region continues to be metropolitan Charlotte. Growth in land use and travel in the southwest part of the urban area has put a strain on the capacity of the original country roads there.

Main Street, US 29, and I-85 have influenced the distribution of growth in the area. Residential and commercial development first came to Main Street, through the middle of the area, then as the congestion got worse US 29 was relocated east and growth spread longitudinally through the area. Then came the Interstate parallel to US 29. The Interstate is both a barrier to travel east and west and to access from the surrounding land. Currently there are only seven interchanges along the twenty mile stretch of I-85. The distance between NC 152 and Lane Street is over five miles and the distance between Poplar Tent Road and the US 29 Connector in Mecklenburg County is four miles. The proposed Westside and Coldwater Connectors and Beattys Ford Road interchange will help open land for development on the southeast, northwest and north sides.

The railroad track runs north and south and splits all five municipalities. This makes it particularly difficult to get from

one side of the area to the other. There are only nine grade separations along the entire length of the railroad. Often, when a train passes through or, worse yet is stopped, traffic can be backed up anywhere along the corridor. Over the years there have been a few attempts by Kannapolis, Concord and the State to reduce the number of at-grade intersections and improve the flow of traffic between the east and west. A planned rail study will help determine other locations for controlled rail crossings.

One of the major barriers to growth in the area are the water supply watersheds. They lie to the west, north, and east of the planning area and drain into the Yadkin-Pee Dee River System. Urban development in the watershed areas will be restricted pushing it toward the south and far north.

As seen in Table 5-1 Cabarrus County is expected to grow faster than the state as a whole. The southwest and west areas of Cabarrus County from NC 73 to Rocky River Road have developed tremendously over the last five years. Future land uses in this area include a new airport, light industry, heavy retail, and hotels. Figure 5-1 shows future land uses in the planning area.

E. TRAVEL DEMAND

As described in Appendix B travel is generated by both housing and employment. Transportation problems are a function of the relative locations of residential and employment centers and the ability of the existing road system to serve the travelers desires. The base year and projected land use information was converted into travel. The information is summarized in Table 5-3. Internal travel is defined as a trip having both trip ends inside the planning area whereas external travel has one of those trip ends outside the planning area. Through travel has both ends outside the planning area. The internal and external travel combined are estimated to increase by 2.49% annually from 1993 to 2020. Through travel is estimated to increase by 2.24% annually. Currently, through travel is 11.5% of total in the area. Internal travel makes up 47.0% of the total travel and external travel makes up 28.9%.

Table 5-3
Travel Data Summary

Year	1993	2020	% Yr Change
Population	77305	131951	2.00
Dwelling Units	33611	58645	2.08
Employment	30189	71254	3.23
Internal Trips	213589	453293	2.83
Secondary Trips	38863	59176	1.57
Comm Vehicle Trips	18391	42811	3.18
Ext-Intl Trips	131114	221060	1.95
Through Trips	52343	95340	2.25
Persons per DU	2.30	2.25	(0.08)
Employ/Pop Ratio	0.39	0.54	1.21

Essential to these travel forecasts are assumptions about income, automobile ownership, automobile occupancy rates, and the number of persons per household. The travel forecasting models used to estimate travel are sufficiently flexible that alternate travel desires can be reevaluated when trend changes are observed.

F. ACCIDENT LOCATIONS

Accident analysis is an important part of the analysis of the existing street system. Accident locations often indicate areas of high congestion and traffic conflict. Accident data for a three year period, November 1991 to October 1994, was studied as part of the transportation plan study. An individual intersection analysis for the whole planning area was done to locate those intersections that are most hazardous and might require immediate attention.

Analysis of accident data can often point to problem areas and deficiencies in design, signing, or sight distances. The number and severity of accidents at locations in the planning area with ten or more accidents within two hundred feet of an intersection were collected. Ninety-four accidents were found inside the planning area. The severity of every accident is indexed with a series of weighting factors developed by the Division of Highways of the NCDOT. A fatal or incapacitating accident is 47.7 times more severe than one involving only property damage, and one resulting in minor injury is 11.8 times more severe than one with only property damage. For all of North Carolina in 1994 the accidents analyzed on all road types had Severity Indexes of 6.51 for US routes, 6.42 for primary routes, 6.22 for secondary routes, and 4.77 for non-system routes. Table 5-4 compares accidents found inside the planning area. The severity listed is the average severity for the intersection.

Among individual intersections NC 152 at Saw Road had the highest Severity Index at 26.41, whereas, US 29 at Country Club Road had the highest number of accidents at 116 over the three years. In addition, specific corridors were analyzed. US 29 between I-85 and Rock Hill Church Road had almost a third of the accidents in the time period. Church Street in Concord had over ten percent of the accidents, and NC 136 between Universal and Centergrove had about six percent.

G. CAPACITY ANALYSIS

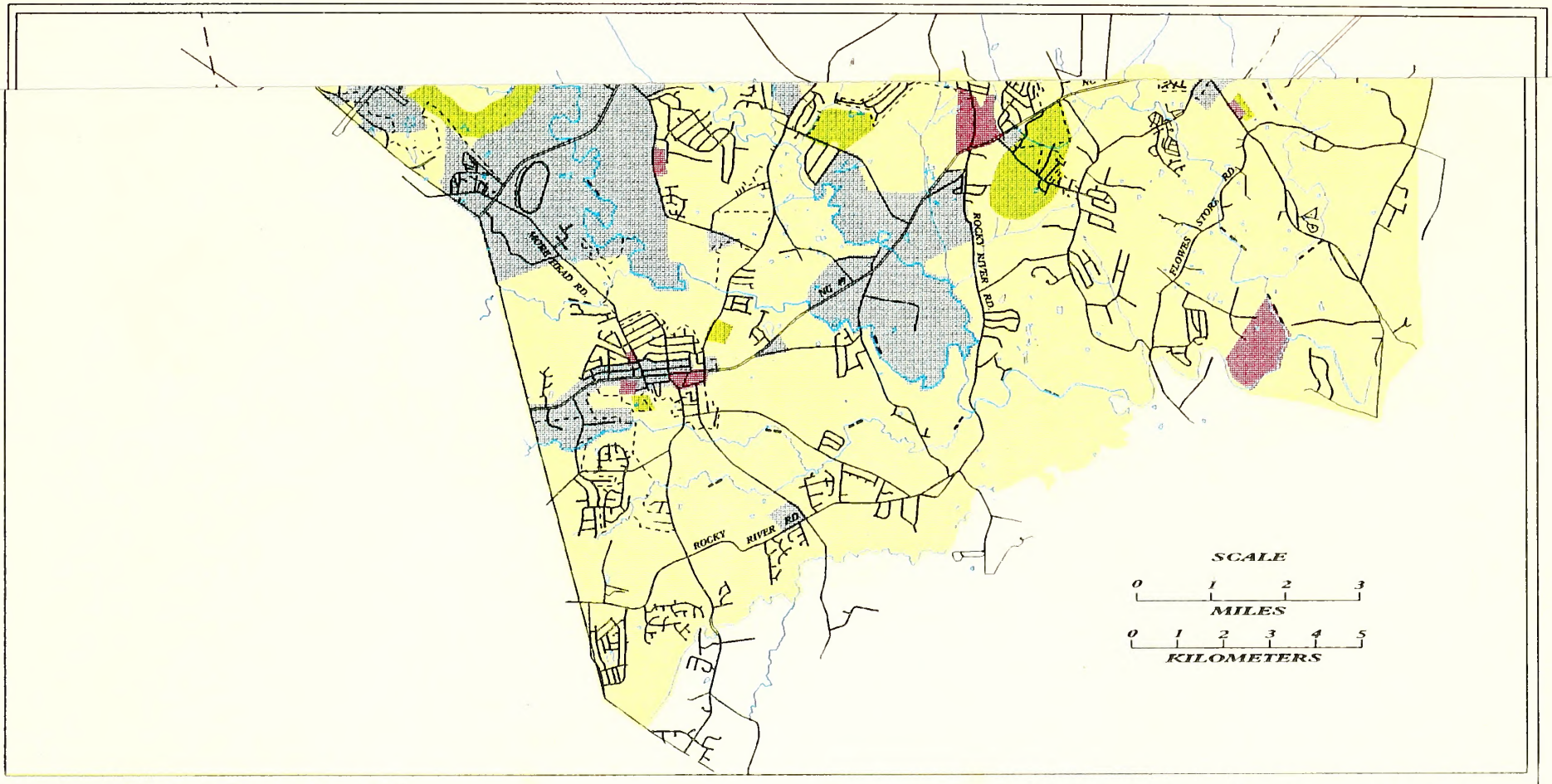
Capacity deficiency analysis is a useful technique for judging the efficiency of a road system. Appendix H contains an explanation of the different Levels of Service of a road and the "practical capacity" of certain facilities at Level of Service D. Level of Service D was used to investigate capacity deficiencies on the existing road system and each of the plan alternatives. Figure 5-2 shows sections of road which are technically already over their practical capacity and should be corrected.

Table 5-4
High Accident Locations

On Road	At Road	Total Acc	Severity Index(SI)	SI by Road Type
NC152	SAW	11	26.41	6.42
NC136	CABARRUS	24	23.73	6.42
US29	MCGILL/POP TENT	24	19.11	6.51
NC152	NC153	10	19.03	6.42
US29	HARDING	31	18.30	6.51
US29	PITT SCHOOL	17	17.99	6.51
US29	CABARRUS	47	17.92	6.51
NC49	CENTRAL HEIGHTS	18	17.57	6.42
CEDAR	KERR	12	16.81	4.77
US29	MAIN-CG	18	16.57	6.51
US29	RYDER	17	15.86	6.51
NC73	CRISCO	12	15.30	6.42
CHURCH	EARL	16	15.12	6.22
US601	WILSHIRE	45	15.05	6.51
POWDER	CABARRUS	11	14.95	6.22
US29	BARNHARDT	19	14.79	6.51
US29	US601	41	14.65	6.51
US29	SUMNER	10	14.54	6.51
NC136	FAIRVIEW	13	14.20	6.42
NC136	RAINBOW	16	13.99	6.42
MAIN	UNIVERSAL	10	13.67	6.22
US601	OLD CHARLOTTE	18	13.55	6.51
NC49	ROBERTA	19	13.35	6.42
NC153	MT MORIAH CH	11	13.31	6.42
US601	NC49	33	13.31	6.51
MT OLIVET	PENNSYLVANIA	12	13.07	4.77
US29	MALL	10	12.73	6.51
US29	BARNETT	11	12.52	6.51
LOOP	NC136	11	12.52	6.42
US29	13TH	11	12.52	6.51
MAIN	RYDER	20	12.30	6.22
US29	US601BUS	25	12.21	6.51
POPLAR TENT	CRISCO	14	11.96	6.22
NC136	MILLER	14	11.96	6.42
CHURCH	MCKANNON	19	11.94	6.22
US29	NC136	45	11.88	6.51
NC136	BROOKWOOD	10	11.86	6.42
US601	CABARRUS	53	11.75	6.51
OLD CHARLOTTE	CABARRUS	12	11.56	6.22
LANE	WRIGHT	12	11.56	6.22
US601	ZION CHURCH	37	11.51	6.51
US601	UNION	14	11.34	6.51
CHURCH	WINECOFF	51	11.11	6.22
BROOKWOOD	CHURCH	19	10.98	6.22
OLD CHARLOTTE	UNION CEMETARY	20	10.96	6.22
US29	LISK	30	10.94	6.51
US29	RIDGE	11	10.87	6.51
BUFFALO	CHURCH	12	10.78	6.22
NC136	RIDGE	13	10.75	6.42
RIDGE	UNIVERSAL	13	10.75	6.22

Table 5-4 (continued)
High Accident Locations

On Road	At Road	Total Acc	Severity Index(SI)	SI by Road Type
KERR	MCGILL	15	10.65	6.22
US29	CENTRAL	39	10.51	6.51
US29	ROCK HILL CH	20	10.05	6.51
NC49	ZION CHURCH	16	10.05	6.42
I-85	NC73	18	10.05	6.42
ORPHANAGE	TRINITY CHURCH	18	10.05	6.22
US601	MAIN-CONCORD	10	10.05	6.51
NC136	MCCLAIN	12	10.05	6.42
LOOP N	MAIN	14	10.05	6.22
US29	DAVIDSON	51	9.86	6.51
CHURCH	CABARRUS	27	9.71	6.22
CENTRAL	MCGILL	21	9.62	6.22
WHITE	CABARRUS	14	9.38	6.22
US29	GOODMAN	24	9.30	6.51
NC136	EASTWOOD	18	9.04	6.42
US29	NC73	23	8.87	6.51
NC49	OLD CHARLOTTE	15	8.82	6.42
US29	DAUGHERTY	12	8.54	6.51
NC136	COUNTRY CLUB	12	8.54	6.42
US29	COUNTRY CLUB	116	8.41	6.51
CORBAN	CROWELL	11	8.37	4.77
E C	ROSE	10	8.24	6.22
US29	PARKWAY	10	8.24	6.51
CHURCH	DAVIDSON	36	8.04	6.22
NC49	MOREHEAD	17	7.90	6.42
NC136	UNIVERSAL	11	7.58	6.42
CORBAN	SPRING	11	7.58	4.77
CORBAN	UNION	14	7.46	6.42
US29	CHAPEL	17	7.39	6.51
POPLAR TENT	ROCK HILL CH	20	7.34	6.22
CHURCH	PALASIDE	35	7.21	6.22
CABARRUS	UNION	18	7.03	6.42
NC73	CENTRAL	18	7.03	6.42
US29	WILLOW	12	7.03	6.51
NC49	FORD	11	6.73	6.42
KERR	CABARRUS	16	6.66	6.22
CHURCH	MEANS	16	6.07	6.22
LANE	PEARL	11	5.94	6.22
MAIN	WINECOFF SCH	15	5.83	6.22
CHESTNUT	NC136	10	4.62	6.42
SPRING	CABARRUS	11	4.29	6.22
I-85	US29	18	4.02	5.45
CENTERGROVE	NC136	13	3.78	6.42
MCCACHERN	MEANS	11	2.65	4.77
Total		1,869		



FUTURE LAND USE

LEGEND

- INSTITUTIONAL
- RECREATIONAL
- COMMERCIAL AND INDUSTRIAL
- RESIDENTIAL

N

S

CABARRUS – SOUTH ROWAN

CABARRUS COUNTY
ROWAN COUNTY
NORTH CAROLINA

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IN COOPERATION WITH THE
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FEDERAL HIGHWAY ADMINISTRATION

FIGURE 5-1

Table 5-4 (continued)
High Accident Locations

On Road	At Road	Total Acc	Severity Index(SI)	SI by Road Type
KERR	MCGILL	15	10.65	6.22
US29	CENTRAL	39	10.51	6.51
US29	ROCK HILL CH	20	10.05	6.51
NC49	ZION CHURCH	16	10.05	6.42
I-85	NC73	18	10.05	6.42
ORPHANAGE	TRINITY CHURCH	18	10.05	6.22
US601	MAIN-CONCORD	10	10.05	6.51
NC136	MCCLAIN	12	10.05	6.42
LOOP N	MAIN	14	10.05	6.22
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I-85	US29	18	4.02	5.45
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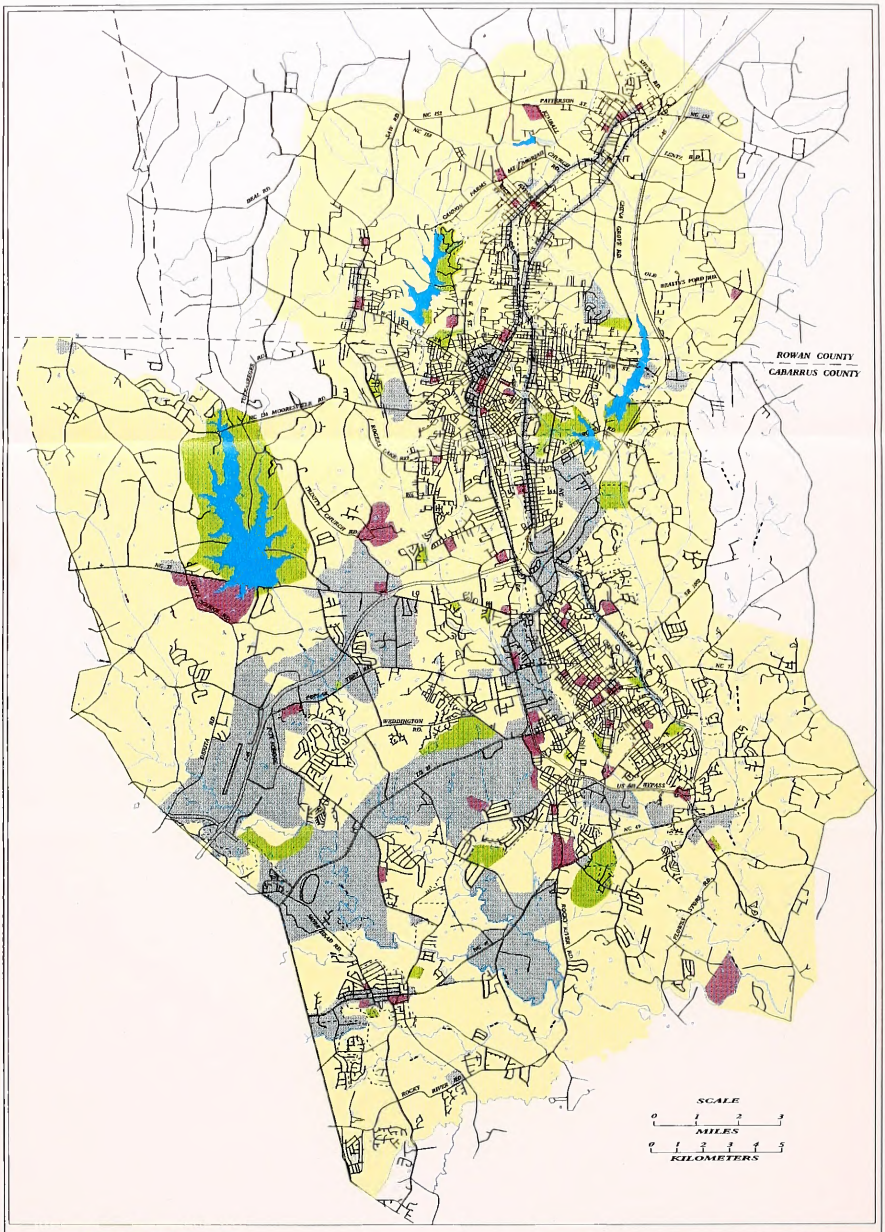
MCCACHERN	MEANS	11	2.65	4.77
Total		1,869		



FUTURE LAND USE

LEGEND

- INSTITUTIONAL
- RECREATIONAL
- COMMERCIAL AND INDUSTRIAL
- RESIDENTIAL

N

S

CABARRUS – SOUTH ROWAN

CABARRUS COUNTY
ROWAN COUNTY
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FIGURE 5-1

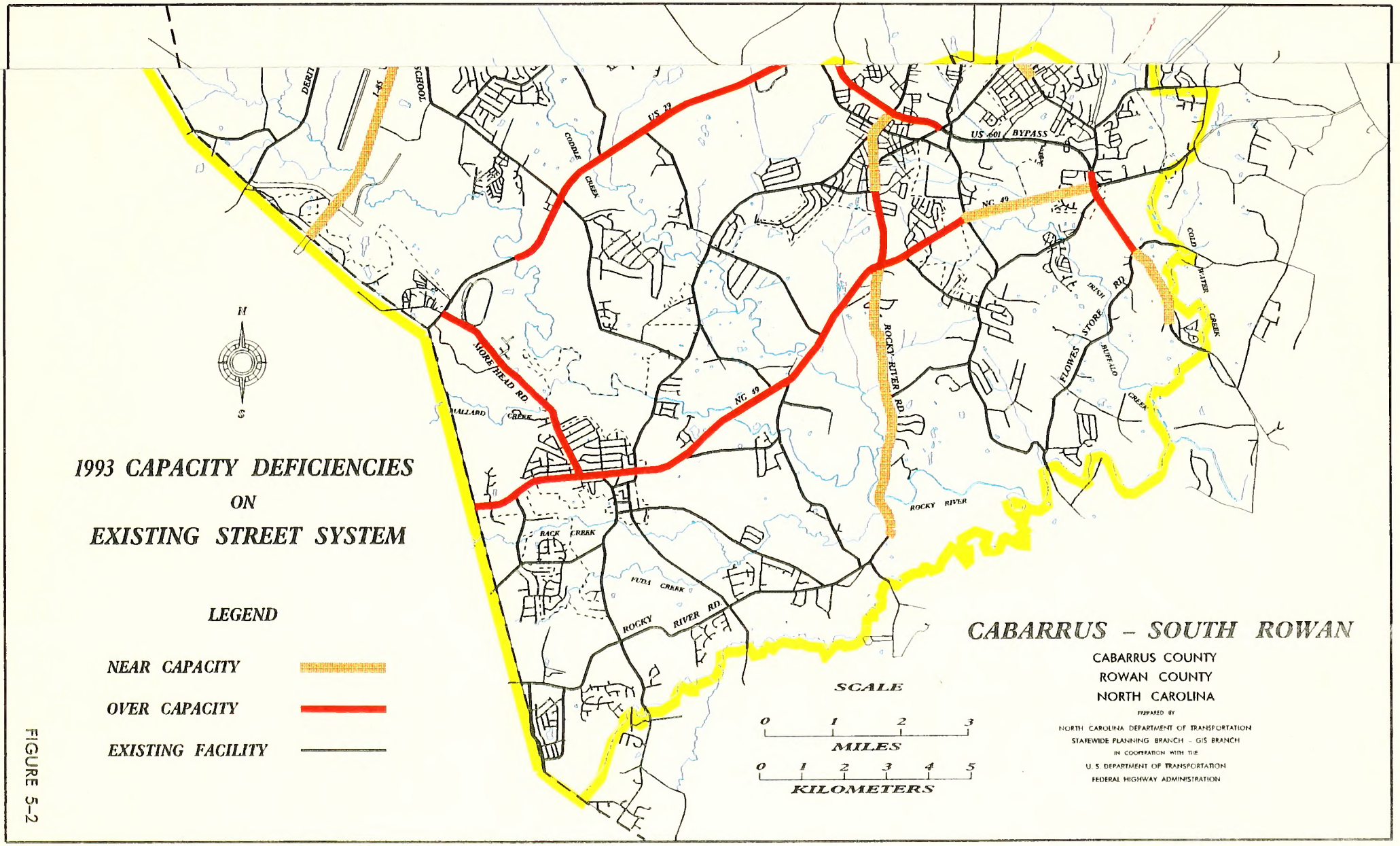
1993 CAPACITY DEFICIENCIES
ON
EXISTING STREET SYSTEM
LEGEND
NEAR CAPACITY
OVER CAPACITY
EXISTING FACILITY
N
S
I-85
US 29
US 601 BYPASS
NC 49
HORSE HEAD RD
ROCKY RIVER RD
ROCKY RIVER RD
FLOWES STORE RD
BUFFALO CREEK
COLD WATER CREEK
COOLE CREEK
MALLARD CREEK
BACK CREEK
ROCKY RIVER
SCALE
0 1 2 3
MILES
0 1 2 3 4 5
KILOMETERS
CABARRUS – SOUTH ROWAN
CABARRUS COUNTY
ROWAN COUNTY
NORTH CAROLINA
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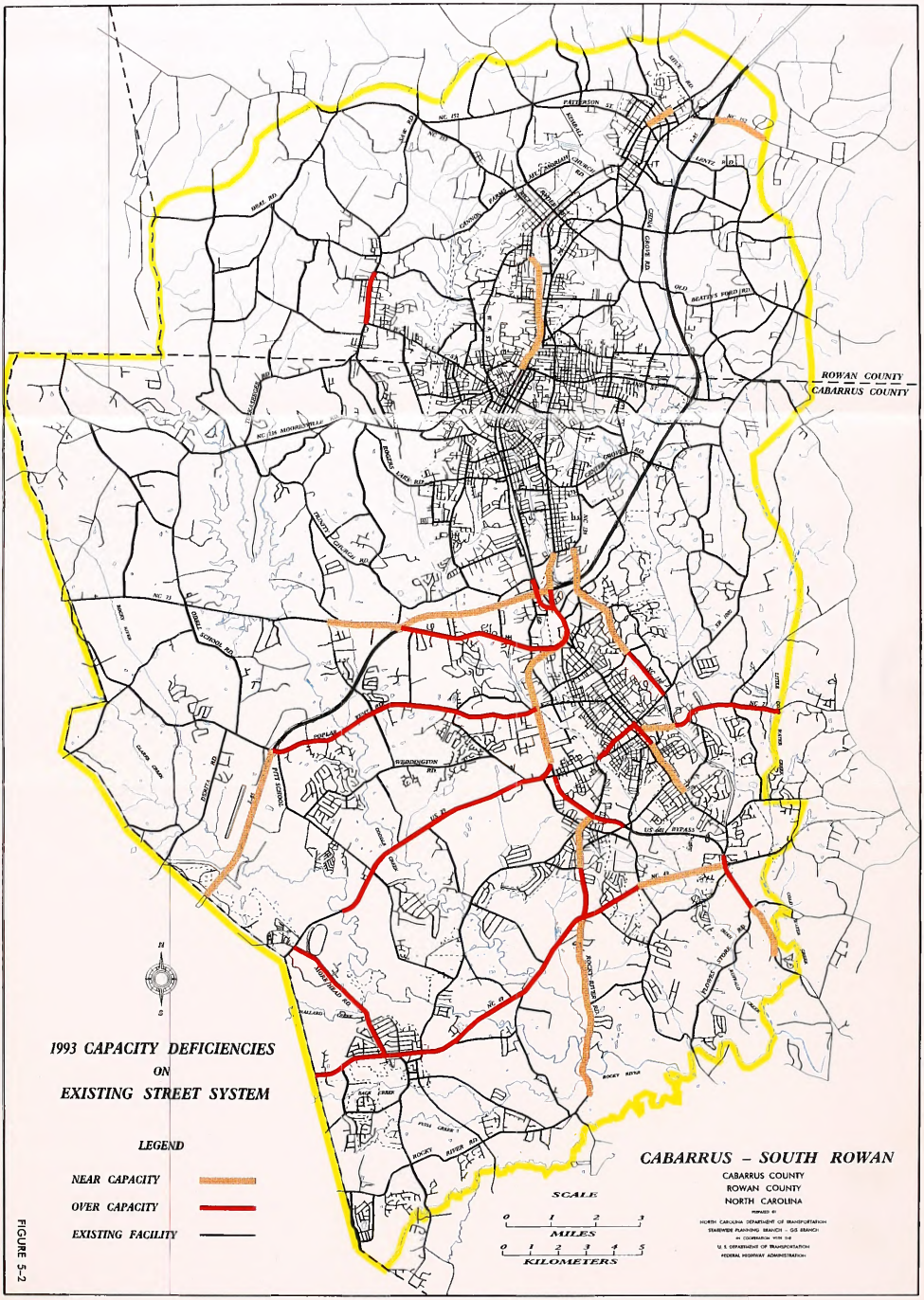
FIGURE 5-2


ROWAN COUNTY
CABARRUS COUNTY
1993 CAPACITY DEFICIENCIES
ON
EXISTING STREET SYSTEM
LEGEND
NEAR CAPACITY
OVER CAPACITY
EXISTING FACILITY
N
S
SCALE
0 1 2 3
MILES
0 1 2 3 4 5
KILOMETERS
CABARRUS – SOUTH ROWAN
CABARRUS COUNTY
ROWAN COUNTY
NORTH CAROLINA
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FEDERAL HIGHWAY ADMINISTRATION

FIGURE 5-2

APPENDIX A. TRANSPORTATION PLANNING PRINCIPLES

A. BASIC PRINCIPLES

Typically, the urban street system occupies 25 to 30 percent of the total developed land in an urban area. Since the system is permanent and expensive to build and maintain, much care and foresight are needed in its development. Thoroughfare planning is the process public officials use to assure the development of the most appropriate street system that will meet existing and future travel desires within the urban area. The major steps involved in the thoroughfare planning process are:

1. Collection of data concerning the existing physical development and travel desires within the area;
2. Development of a (computer) model which reflects present travel desires;
3. Prediction of future socio-economic data and the computation of future travel desires using the computer model;
4. Evaluation of the adequacy of the existing street system to serve present and future travel;
5. Formulation of the best thoroughfare plan on the basis of travel demand, economic benefits, and environmental considerations to meet future travel desires;
6. Development of construction priorities for plan implementation;
7. Implementation of the plan.

B. OBJECTIVES OF THOROUGHFARE PLANNING

The primary aim of a thoroughfare plan is to guide the development of the urban street system in a manner consistent with changing traffic so errors and much needless expense can be averted. A thoroughfare plan will enable street improvements to be made as traffic demands increase, and help eliminate unnecessary improvements. Local officials and citizens will be informed about future improvements and act in accordance with the plan.

By developing an urban street system that can keep pace with increasing traffic demands, a maximum utilization of the system can be attained that will require a minimum amount of land for street purposes. Each street can be designed to perform a specific function and save on right-of-way and construction costs. The location of present and future population, commercial, and industrial enterprises affects major street and highway locations. Conversely, the location of major streets and highways within the urban area will influence the urban development pattern.

Other objectives of a thoroughfare plan include: (1) to provide for the orderly development of an adequate major street system as land development occurs; (2) to reduce travel and transportation costs; (3) to reduce the cost of major street improvements to the public through the coordination of the street system with private action; (4) to enable private interests to plan their actions, improvements, and development with full knowledge of public intent; (5) to minimize disruption and

displacement of people and businesses through long range advance planning for major street improvements; (6) to reduce environmental impacts such as air pollution resulting from transportation; and (7) to increase travel safety.

Thoroughfare planning objectives are achieved through both improving the operational efficiency of thoroughfares and improving the system efficiency through system coordination and layout.

C. OPERATIONAL EFFICIENCY

A street's operational efficiency is improved by increasing the capability of the street to carry vehicular traffic and people. In terms of vehicular traffic, a street's capacity is defined as the maximum number of vehicles which can pass a given point on a roadway during a given time period under prevailing roadway and traffic conditions. Capacity is affected by the physical features of the roadway, the nature of the traffic, and the weather.

Physical ways to improve vehicular capacity include street widening, intersection improvements, improving vertical and horizontal alignment, and eliminating roadside obstacles. For example, widening of a street from two to four lanes more than doubles the capacity of the street by providing additional maneuverability for traffic. Impedances to traffic flow caused by slow moving or turning vehicles and adverse effects of horizontal and vertical alignments are thus reduced.

There are several different approaches to increasing the capacity and thereby reducing the congestion on a roadway. In 1992 the Institute of Transportation Engineers (ITE) published the report "A Toolbox for Alleviating Congestion." It lists proven strategies for dealing with congestion. Many of these strategies are used by transportation professionals in North Carolina.

Operational Alternatives for Increased Efficiency

Freeway Incident Management - Pre-planned coordination of personnel, equipment, and materials to reduce incident detection, response and clearance time. Incident management programs use combinations of strategies and technologies to achieve their goal. Some of these strategies include: roving service vehicles, motorist aid call boxes, dedicated cellular phone lines, incident management teams, motorist information systems, traffic diversion techniques, and alternate route identification. Incident management technologies include traffic surveillance systems that incorporate mainline detectors, variable message signs, closed-circuit television, advanced communication systems, and highway advisory radios.

Surveillance and Control Systems - These systems are demand responsive and change traffic controls according to volumes on roadways. Often they combine with IVHS technology with sophisticated signal timing packages for computerized signal systems.

Motorist Information Systems - Variable message signs, highway advisory radio, or other technologies can be used to inform motorists about congested routes, traffic incidents, construction and alternate routes to help them anticipate and avoid congested areas.

Ramp Metering - The placement of a modified traffic signals at the ends of ramps allows traffic to enter a freeway either at pre-timed intervals or according to the need of the traffic. The merging traffic experiences increased delay but the mainline traffic experiences increased speeds and an increase in safety.

High Occupancy Vehicle Lanes (HOV) - This involves the designation of existing traffic lanes for exclusive use by high occupancy vehicles like carpools, vanpools, and buses. These can be altered according to demand to increase capacity during certain times of day or for special events.

Super Street Arterials - This involves upgrading major arterials to improve traffic flow by restricting it on crossing facilities. They include: traffic channelization, street and intersection widening, exclusive turn lanes, turn prohibitions, one-way streets, reversible lanes, railroad grade separations, upgrading traffic control devices, parking removal, lighting improvements, and bus turnout bays.

Traffic Signal Improvements - These improvements include updating equipment, revising timing, interconnected or computerized signal systems, and removal of unwarranted signals. Developing a regular signal maintenance plan can also optimize existing signalized intersections.

Arterial Management - This involves the development of a range of surveillance and management strategies to better manage the existing arterial system.

Intersection Improvements - These strategies incorporate traffic control devices to improve the flow of vehicles and pedestrians. They include stop and yield signs, traffic signs, turning lanes, traffic islands, channelization, and improved intersection designs.

Turn Prohibitions - These reduce turn conflicts, congestion, and accidents by controlling certain intersection movements, primarily during peak traffic hours.

One-way Streets - This can reduce congestion along parallel routes that have high volumes and high vehicle conflict. The capacity of a street can be increased by 20-50%, depending on turning movements and street width. Central business districts or other major activity centers are usual locations.

Reversible Traffic Lanes - These are useful on routes with high peak hour directional flow. They provide additional capacity in the direction of the heaviest traffic such as during the a.m. peak and then reversing for the other direction during the p.m. peak.

Parking Management - A parking management plan can help reduce congestion by providing, controlling, regulating and restricting parking and parking spaces. This can encourage or discourage auto usage in certain areas and promote mode shifting.

Goods Movement Management - Transportation systems not only move people, but goods. Trucks make up a fraction of the total vehicle mix on the road they contribute a great deal to the congestion. Congestion can be reduced on some roads by the management of time and location of truck pickups and deliveries. The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) placed and increased emphasis on the relationship between the movement of goods and the overall efficiency of the transportation network. Methods to decrease delays include improving efficiency on intermodal links, improving accessibility to the different modes, and designating corridors for the major modes of goods transport. This includes both rail and shipping.

Intelligent Vehicle Highway Systems - IVHS is not a single system or service. It is a range of interrelated services that will be implemented over time and involve technological improvements designed to optimize the existing transportation system. IVHS is divided into five areas--Advanced Traffic Management System (ATMS); Advanced Traveler Information System (ATIS); Advanced Vehicle Control Systems (AVCS); Advanced Public Transportation Systems (APTS); and Commercial Vehicle Operations (CVO).

Measures To Increase Capacity

New Highways - The construction of new facilities on new location is effective in relieving congestion on existing facilities.

Roadway Widening - Capacity can be increased by the addition of new lanes. Drivers perceive wider lanes to be safer and will therefore travel at higher speeds reducing slowdowns and bottlenecks.

Adding Lanes Without Widening - Reducing the lane width of existing lanes to provide and additional travel lane can increase the capacity of an existing facility. This solution is limited to facilities with existing wide travel lanes and relatively low speeds.

System Improvements - Congestion is often caused by an inefficient street system. A more efficient system can reduce travel distances, travel times and costs. Improvements can be achieved through the functional classification of streets and the development of a coordinated major street system.

Access Control - The most restrictive functionally classified facilities are designed to provide mobility for vehicles in through lanes whereas the least restrictive are designed to provide access to abutting property.

Geometric Design - Improving the geometric design of roadways can significantly improve operations and traffic flow. Improvements are based on specific design criteria, traffic volumes, speed, and sight distances. Changes in design can improve horizontal and vertical alignment, shoulder and overhead clearances, additional width or number of lanes, the number of median crossovers, and intersections. Geometric improvements generally have high benefit cost ratios.

Reconstruction - Capacity can be increased by improving geometric and structural standards, the quality of operation and safety, and by improvements that extend the life-span of the facility.

Grade Separations - The physical separation of intersecting facilities eliminates traffic conflicts and can substantially increase the capacity and safety of both facilities.

Railroad Grade Separations - Likewise the elimination of at-grade railroad crossings can improve the safety, capacity and speed of both facilities.

Transit Service Improvements

Fixed Guideway Transit Construction - Improvement of transit service through construction of heavy rail transit, light rail transit, commuter rail transit, or a transitway is a means of moving large numbers of people in a fast, efficient, and reliable manner.

Fixed Route and Express Bus - Fixed route service operates on a regularly scheduled route, picking up and discharging passengers at specific locations. Express service has a portion of the route operating without stops. Express service is attractive for an area with a large number of commuters in outlying suburban areas who desire fast service to major employment centers.

Paratransit and Ridesharing - Paratransit service includes carpooling, vanpooling, subscription bus, shared taxi, or route-deviation services. It provides a mode option for low density areas with highly dispersed travel.

Land Use Policies to Improve Transit Access - Some examples of these policies are density requirements, construction of public transportation facilities, and planning/zoning regulations.

Site Design Criteria to Increase Transit Usage - Requiring that site designs incorporate transit access or reduce auto access can be an effective measure in mitigating traffic congestion.

Transit-Oriented Parking Management - Encouragement of transit use and discouragement of the use of single-occupancy vehicles through parking management. Parking fees, long distances to parking lots, or reduced numbers of spaces can be a disincentive to automobiles.

Employer Initiatives that Encourage Transit Use - Four major initiatives employers can use are: encouragement for ridesharing; capitalizing on tax write-offs for employee transit subsidies; instituting flex-time programs; and participating in transportation management associations.

Transportation Demand Management

Growth Management - Public policy can be used to regulate the location, pattern, density, and rate of growth of development. Growth regulations are tied to the capacity of the existing system. Growth management controls congestion by restricting development unless a way to mitigate congestion impacts is proposed and implemented.

This type of policy could by applied to corridors identified in the Congestion Management System. New developments with the potential to cause congestion to increase beyond a predetermined threshold for a facility can be required to implement strategies to prevent such increases. Studies show that urban areas should add macro-level land development decisions to their toolbox for congestion management.

Road Pricing - Road pricing encourages motorists to change their travel behavior by attaching a cost to the use of a roadway.

Auto Restricted Zones - These are any land area where traffic is regulated, controlled or restricted. They are meant to preserve and enhance the vitality of urban centers, the environment and encourage the use of non-auto modes.

Trip Reduction Ordinances - These regulate the number of trips that can be produced by new development.

D. SYSTEM EFFICIENCY

Another means for altering travel demand is the development of a more efficient system of streets that will better serve travel desires. A more efficient system can reduce travel distances, time, and cost. Improvements in system efficiency can be achieved through the concept of functional classification of streets and development of a coordinated major street system.

1. Functional Classification

Streets perform two primary functions-- traffic service and land service, which when combined, are basically incompatible. The conflict is not serious if both traffic and land service demands are low. However, when traffic volumes are high, conflicts created by uncontrolled and intensely-used abutting property lead to intolerable traffic flow friction and congestion.

The underlying concept of the thoroughfare plan is that it provides a functional system of streets which permits travel from origins to destinations with directness, ease, and safety. Different streets in the system are designed and called on to perform specific functions, thus minimizing the traffic and land

service conflicts. Streets are categorized as to function as local access streets, minor thoroughfares, or major thoroughfares.

Local access streets provide access to abutting property. They are not intended to carry heavy volumes of traffic and should be located such that only traffic with origins and destinations of the streets would be served. Local streets may be further classified as either residential, commercial, and/or industrial depending upon the type of land use which thy serve.

Minor thoroughfares are more important streets on the city system. They collect traffic from local access streets and carry it to the major thoroughfare system. They may in some instances supplement the major thoroughfare system by facilitating minor through traffic movements. A third function is to provide access to abutting property. They should be designed to serve limited areas so that their development as major thoroughfares will be prevented.

Major thoroughfares are the primary traffic arteries of the city. Their function is to move intra-city and inter-city traffic. The streets which comprise the major thoroughfare system may also serve abutting property, however, their function is to carry traffic. They should not be bordered by uncontrolled strip development because such development significantly lowers the capacity of the thoroughfare to carry traffic and each driveway is a danger and an impediment to traffic flow. Major thoroughfares may range from a two-lane street carrying minor traffic volumes to major expressways with four or more traffic lanes. Parking normally should not be permitted on major thoroughfares.

2. Idealized Thoroughfare Plan System

A coordinated system of major thoroughfares forms the basic framework of the urban street system. A major thoroughfare system which is most adaptable to desired lines of travel within an urban area and which permits movement between various areas of the city within maximum directness is the radial-loop system. This system consists of several functional elements--radial streets, crosstown streets, loop system streets, and bypasses. An ideal thoroughfare plan is shown in Figure A-1.

Radial streets provide for traffic movement between points located on the outskirts of the city and the central area. This is a major traffic movement in most cities, and the economic strength of the central business district depends upon the adequacy of this type of thoroughfare.

If all radial streets crossed in the central area, an intolerable congestion problem would result. To avoid this problem, it is very important to have a system of crosstown streets which form a loop around the central business district. This system allows traffic moving from origins on one side of the central area to destinations on the other to follow the area's border and allows central area traffic to circle and then enter the area near a given destination. The effect of a good crosstown system is to free the central area of crosstown traffic, thus permitting the central area to function more adequately in its

role as a pedestrian shopping area.

Loop system streets move traffic between suburban areas of the city. Although a loop may completely encircle the city, a typical trip may be from an origin near a radial thoroughfare to a destination near another radial thoroughfare. Loop streets do not necessarily carry heavy volumes of traffic, but they function to help relieve central areas. There may be one or more loops, depending on the size of the urban area, and they are generally spaced one-half mile to one mile apart, depending on the intensity of land use.

A bypass is designed to carry traffic through or around the urban area, thus providing relief to the city street system by removing from it traffic which has no desire to be in the city. Bypasses are usually designed to through-highway standards, with control of access. Occasionally, a bypass with low traffic volume can be designed to function as a portion of an urban loop. The general effect of bypasses is to expedite the movement of through traffic and to improve traffic conditions within the city. By freeing the local streets for use by shopping and home-to-work traffic, bypasses tend to increase the economic vitality of the local area.

E. APPLICATION OF THOROUGHFARE PLANNING PRINCIPLES

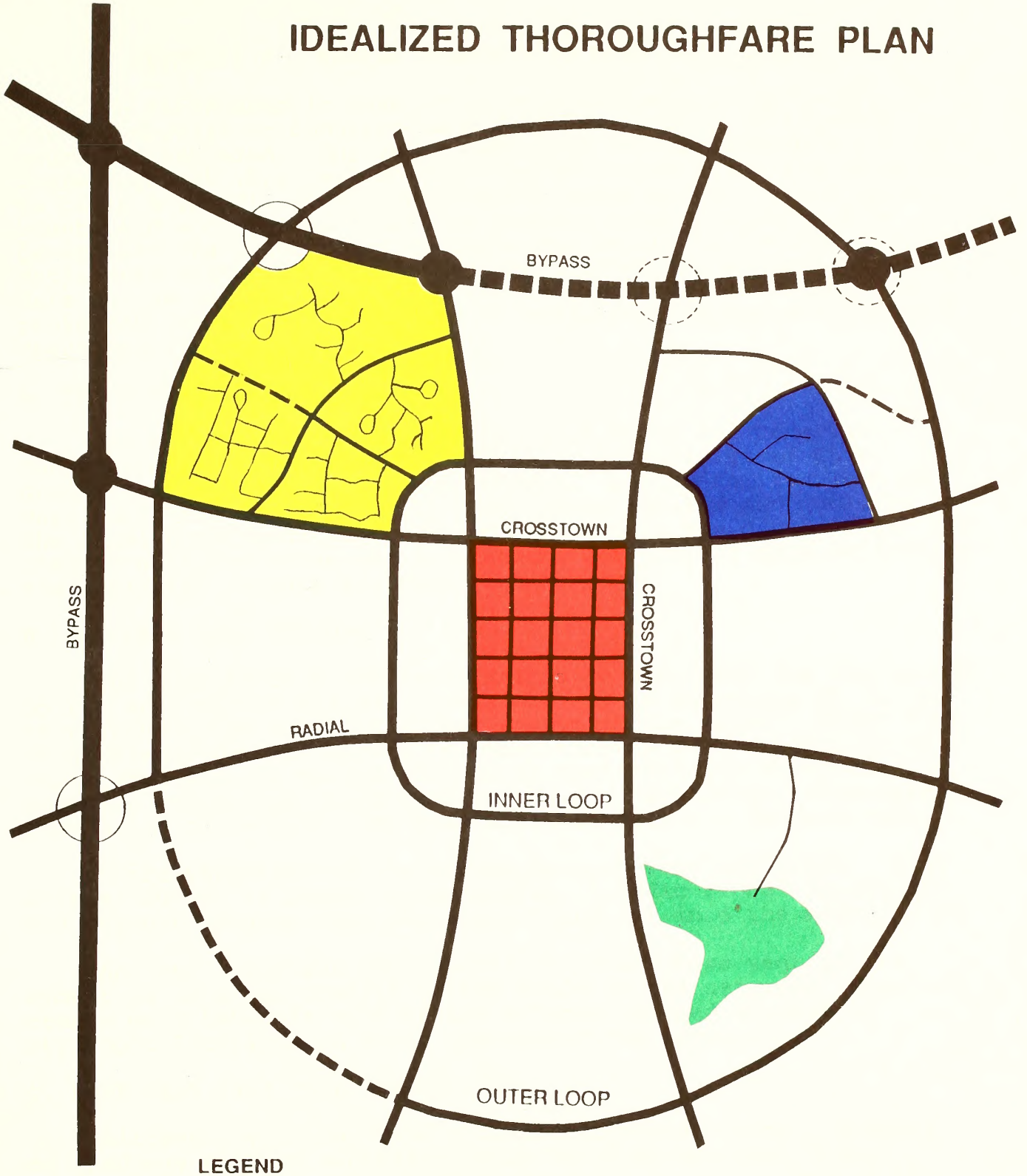
The concepts presented in the discussion of operational efficiency, functional classification, and idealized major thoroughfare system are the conceptual tools available to the transportation planner in developing a thoroughfare plan. In actual practice, thoroughfare planning is done for established urban areas and is constrained by the existing land use and street patterns, existing public attitudes and goals, and current expectations of future land use. Compromises must be made because of these and the many other factors that affect major street locations.

A thoroughfare plan should be derived from a thorough knowledge of today's travel, its component parts and the factors that contribute to it, limit it and modify it. Traffic demands must be sufficient to warrant the designation and development of each major street. The plan should be designed to accommodate a large portion of all major traffic movements on a relatively few streets.

The plan should conform to and provide for the land development plans in the area. Certain considerations must be given to urban development beyond the current planning period. It is necessary to designate thoroughfares on a long-range planning basis to protect rights-of-way for future development, particularly in sparsely developed outlying areas.

The plan must also be economically feasible.

IDEALIZED THOROUGHFARE PLAN



LEGEND

	EXISTING	PROPOSED
MAJOR THOROUGHFARE FREEWAY	▬▬▬	▬ ▬ ▬
MAJOR OTHER	▬▬▬	▬ ▬ ▬
MINOR THOROUGHFARE	▬▬▬	▬ ▬ ▬
LOCAL ROAD	▬▬▬	
INTERCHANGE	●	◉
GRADE SEPERATION	○	○

LAND USES

- COMMERCIAL/BUSINESS
- RESIDENTIAL
- INDUSTRIAL
- PUBLIC/INSTITUTIONAL

FIGURE A-1

APPENDIX B. TRAVEL FORECASTING MODEL AND ANALYSIS

The first step in developing an efficient transportation plan for any area is to construct and calibrate a base year traffic model for the area. Any recommendations for the future are then tested against this base model. The following steps are necessary to build a traffic model: define the study area, collect traffic counts and socioeconomic data by traffic zone, determine trip generation characteristics of the area, calibrate the model so it duplicates area travel patterns, and project the socioeconomic data to the design year. Once the socioeconomic data has been projected the model may be used to evaluate problems and possible solutions to them.

A. THE STUDY AREA

The study area consists of parts of Rowan and Cabarrus Counties surrounding and west of the municipalities of China Grove, Landis, Kannapolis, and Concord. A plan for the Town of Harrisburg was completed only a few years earlier and included in the final recommendations. The planning area was divided into 389 traffic analysis zones and 43 stations for ease of data collection and analysis. Figure B-1 shows the zone map.

B. THE BASE YEAR NETWORK

The purpose of a traffic model is to duplicate the conditions on the area street system. Therefore, it is necessary to attempt to represent the existing street system in the model. There must be a balance between having too many streets on the model to be calibrated and not enough streets to realistically duplicate existing conditions. All numbered routes, some major arterials, some major collectors, and some local streets are represented.

Characteristics of the street network were collected. Lane widths, number of lanes, speed limits, traffic signal locations, and segment lengths were inventoried and put into the model.

Another important characteristic of the base year is the amount of existing traffic on the roads on the network. Traffic counts were taken at each of the 43 stations and at several strategic locations on roads throughout the network.

C. BASE YEAR 1993 TRIP GENERATION

Different vehicles make different types of trips. A section of road may contain vehicles making External-External trips, Internal-Internal trips, External-Internal trips, or one of the many types of Internal-Internal trips. Table B-4 lists each station and the number of trips for each trip type.

Internal-Internal are trips with both ends occurring inside the planning area. Average weekday trips produced inside the area were divided into those produced by dwelling units, by commercial cars and trucks and by taxis. Those trips produced by residents in the area's dwelling units are a function of the number and type of housing stock in each of the 389 traffic analysis zones. A 100% survey of the housing stock was done for the base year of

1993. These dwelling units were then stratified into five categories--Excellent, Above Average, Average, Below Average, and Poor. They were given trip generation rates as shown in Table B-1. Dormitories and group housing were given special generation rates. Commercial cars and trucks and taxis had generation rates of 6.70, 6.70, and 40.0 vehicle trips per day. Table B-5 lists the number of dwelling units of each type and commercial vehicles in each zone for the base year.

Table B-1
Trip Generation Rates per Dwelling Type
(Trips per Day)

Year	Excel	Above Average	Average	Below Average	Poor	Dorm	Group	Overall Average
1993	12.50	11.00	9.00	7.00	5.50	3.00	1.00	7.00
2020	13.30	11.80	9.80	7.60	6.10	3.60	1.60	7.69

External-Internal trips are those in which one end occurs outside the planning area. The trips are considered to be produced at any one of the 43 external cordon stations and attracted to the zones based on the employment and housing there.

External-External, or through, trips are those which do not stop within the planning area but travel through it from one station to another along some path. These trips are accounted for by the external station counts.

The Internal trips were reduced by 20% to reflect trips made by vehicles garaged inside the planning area but with destinations outside the area which would then be accounted for in cordon station counts. The resulting internal trips were divided into three trip purposes: Home-based work (HBW) at 22% of Internal, Other home-based (OHB or HBO) at 50%, and (NHB) at 28%. Added back to the internal trips are those non-home based trips generated by vehicles garaged outside the planning area. The secondary non-home based trips, 38863, were estimated using the following equation:

Secondary NHB Trips = (Total Ext-Int Trips) - Ext-Int Trips Garaged Inside Planning Area x 0.50

D. BASE YEAR 1993 TRIP ATTRACTIONS

Trip attractions for each internal trip purpose are based on each zone's relative "attractiveness" which is calculated as a function of its amount and type of employment. Each zone has an estimated number of trips produced and attracted for each of the three internal trip purposes.

Zonal productions and attractions were developed by a computer program used by the North Carolina DOT called Internal Data Summary. Using given occupation rates and trip generation rates productions are calculated from dwelling units, trucks, car,

and taxis. This program also uses a multiple regression equation, based on an analysis by Dr. Leftwich, to develop the attractions data using factors corresponding to the different employment types. Coefficient data for the equations are borrowed from studies of areas similar in size and nature. Each equation is applied to all the zones in the planning area. Occasionally there are some zones that contain special generators or attractors such as a regional hospital or shopping center that must be compensated for. This was done by adding an additional shopping factor to the equation only for those zones. This was used only for calibration purposes.

In the internal data summary for the Kanlacon study the HBW trip attractions are equal to the total employment for each zone. The total attractions were balanced to equal total productions by purpose throughout the area. The coefficients for the other purposes appear in Table B-2. A list of the number of employees in each zone by grouping for the base year of 1993 appears in Table B-6.

The generic regression equation is:

$$Y = aX_1 + bX_2 + cX_3 + dX_4 + eX_5 + fX_6 + gX_7 + hX_{12}$$

where,

X_1 = Industrial Employment SIC # 1-49
X_2 = Retail Employment SIC # 50-54, 56, 57, 59
X_3 = Highway Retail Employment SIC # 55, 58
X_4 = Office & Institutional Employment SIC # 60-67, 91-97
X_5 = Service Employment SIC # 70-76, 78-89, 99
X_6 = Extra Retail Employment SIC # 50-54, 56, 57, 59
X_7 = Mall or Large Site Employment SIC # 50-54, 56, 57, 59
X_{12} = Dwelling Units

Table B-2
Attraction Coefficients

Purpose	a	b	c	d	e	f	g	h
HBO	0.20	1.83	8.36	2.60	2.55	1.50	2.00	0.50
NHB	0.20	1.83	8.36	2.60	2.55	1.50	2.00	0.50
EXT-INT	0.50	1.83	8.36	2.60	2.55	1.50	2.00	0.50

E. BASE YEAR 1993 TRIP DISTRIBUTION AND ASSIGNMENT

The Gravity Model was used to distribute the Internal trips, HBW, HBO, NHB, Sec NHB, and Ext-Int to each traffic zone using friction and trip length frequency factors shown in Table 9. A Fratar Trip Balancing program was used to distribute through trips. These tables were combined and a minimum-time path all-or-nothing assignment between zones was used to spread all the trips to the existing highway network.

F. BASE YEAR NETWORK ACCURACY CHECKS

The next step was calibrating the modelled volumes to match the existing ground counts. An important part of model calibration is the screenline check. A screenline is an imaginary line drawn through or around a planning area. Traffic counts are taken on every street that cross these lines and summed for a sample total volume of traffic. The same screenline count total taken from the model network is then compared to the ground count sample. This indicates whether the total amount of traffic on the network is correct. Line 1 runs north and south along the railroad track through Kannapolis. Line 2 runs east-west between China Grove and Landis. Line 3 runs along I-85 and line 4 runs along US 29. The comparison is in Table B-3.

Table B-3
Screenline Check

Line #	Total Crossings Count Volumes	Assigned Volumes	Percent Accuracy
1	80240	87260	1.09
2	86320	94858	1.10
3	58520	54832	0.94
4	95820	84364	0.88
Total	199590	199567	1.00

G. FUTURE YEAR 2020 TRAVEL

ISTEA requires a closer relationship between land use and transportation. Therefore, an iterative process was used to produce the future year socioeconomic data. A Delphi process was used to generate the first iteration of numbers using projections from the previous study. That data was loaded into the model and analyzed. The local staffs were asked if they wanted to revise the projections based on the deficiency analysis. The data was revised and the recommended plan is based on the last iteration. Table B-7 lists the 2020 dwelling units and Table B-8 lists employment by type for each zone.

Future year station volumes were projected to 2020 using historic trends and adjusted for expected development around the planning boundary. The future through trips, external-internal trips, and secondary non-home-based trips were determined by the same method as the 1993 numbers. Table B-4 shows this breakdown. Secondary non-home-based trips were calculated at 59176 using the same method as the 1993 trips.

Table B-4
1993 and 2020 External Station Analysis

Ext Sta No.	Station Location	1993 Total	1993 Thru	1993 Ext-Int	2020 Total	2020 Thru	2020 Ext-Int
401	I-85 N	48640	43647	4993	91400	81241	10159
402	NC 152 E	6000	825	5175	9000	1227	7773
403	Daughtery Rd	760	33	727	1200	51	1149
404	Scercy Rd	120	0	120	300	0	300
405	Old Concord Rd	2360	64	2296	3200	89	3111
406	Old Beatty Ford Rd	2840	26	2814	3700	33	3667
407	Irish Potato Rd	2520	26	2494	2900	29	2871
408	Sapp Rd	680	12	668	1100	10	1090
409	Gold Hill Rd	2140	44	2096	2800	57	2743
410	NC 73 E	8600	304	8296	13000	461	12539
411	Old Airport Rd	1960	18	1942	2600	23	2577
412	NC 49 E	9700	5588	4112	16000	9277	6723
413	Miami Church Rd	1960	20	1940	3000	30	2970
414	US 601 S	9780	1996	7784	18000	3678	14322
415	Flowes Store Rd	1740	16	1724	2700	26	2674
416	Rocky River Rd	2400	26	2374	3400	37	3363
417	Pharr Mill Rd	760	10	750	1100	16	1084
418	NC 49 W	13520	5665	7855	23000	9510	13490
419	Roberta Rd	3840	40	3800	5700	60	5640
420	Morehead Rd	6420	117	6303	10000	183	9817
421	US 29 S	17300	1518	15782	24000	2119	21881
422	Union School Rd	1500	0	1500	2700	57	2643
423	I-85 S	52660	39832	12828	98000	74576	23424
424	Derita Rd	700	6	694	3000	28	2972
425	Christenbury Rd	160	0	160	5600	0	5600
426	Poplar Tent Rd	2300	136	2164	3200	190	3010
427	Harris Rd	820	6	814	1400	10	1390
428	NC 73 W	4400	400	4000	8500	771	7729
429	Odell School Rd	2520	26	2494	3800	39	3761
430	NC 136 W	2860	77	2783	5000	138	4862
431	Archer Rd	580	4	576	750	5	745
432	Deal Rd	1100	10	1090	1800	14	1786
433	Unity Rd	380	4	376	800	8	792
434	NC 152 W	4740	2973	1767	7360	4653	2707
435	Concordia Church Rd	260	2	258	360	3	357
436	Millbridge Rd	1800	20	1780	6000	100	5900
437	Country Estates Rd	100	0	100	270	0	270
438	Brown Rd	900	22	878	1300	32	1268
439	Stirewalt Rd	620	4	616	1500	10	1490
440	Barnhardt Rd	200	2	198	500	5	495
441	Miller Rd	2400	48	2352	4200	85	4115
442	Shue Rd	1420	28	1392	2600	52	2548
443	US 29 Bus N	9340	1091	8249	15000	1747	13253
Totals		235800	104686	131114	411740	190680	221060

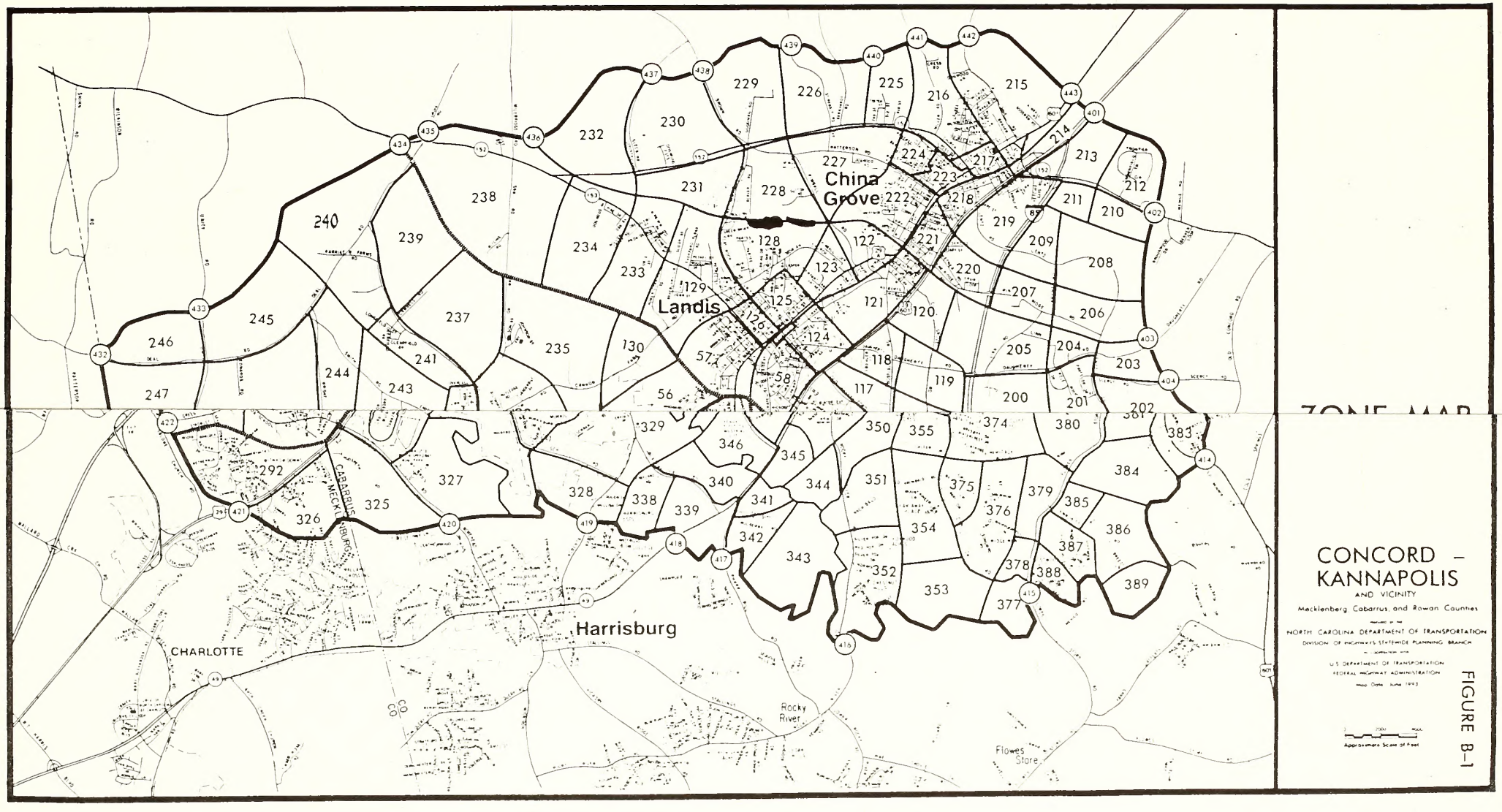

China Grove
Landis
Harrisburg
CHARLOTTE
CABARRUS
MECKLENBURG
Rocky River
Flowes Store
ZONE MAP
CONCORD – KANNAPOLIS
AND VICINITY
Mecklenburg, Cabarrus, and Rowan Counties
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS STATEWIDE PLANNING BRANCH
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
Map Date: June 1993
Approximate Scale of Feet

FIGURE B-1

ZONE MAP

CONCORD – KANNAPOLIS AND VICINITY

Mecklenburg, Cabarrus, and Rowan Counties

Prepared by the NORTH CAROLINA DEPARTMENT OF TRANSPORTATION Division of Highways, Planning Branch

In cooperation with the U.S. DEPARTMENT OF TRANSPORTATION Federal Highway Administration

1980 Base Map

Approximate Scale of Feet

FIGURE B-1

Table B-5
Friction Factors and Travel Curve Data

Time	Friction Factors				HBW		HBO		NHB		E-I	
	HBW	HBO	NHB	E-I	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent
1	79523	39582	33214	45764	571	1.22	1287	1.20	3049	2.60	228	.17
2	95123	90484	90484	90484	1179	2.51	5099	4.77	8573	7.32	726	.55
3	90484	81873	81873	81873	1933	4.11	9201	8.61	14875	12.71	3628	2.77
4	86071	74082	74082	74082	3375	7.18	13887	12.99	23161	19.78	2898	2.21
5	81873	67032	67032	67032	4102	8.73	16762	15.69	26487	22.62	4049	3.09
6	77880	60653	22983	60653	4489	9.55	19957	18.67	12326	10.53	4795	3.66
7	74082	23888	11788	54881	4559	9.70	9676	9.05	7310	6.24	7153	5.46
8	70469	13288	7130	24829	4883	10.39	7267	6.80	5281	4.51	7150	5.45
9	67032	8513	4721	14978	4636	9.87	5103	4.78	3630	3.10	7522	5.74
10	63763	5893	3309	10164	4496	9.57	3825	3.58	2827	2.41	7690	5.86
11	60653	4285	2413	7358	4483	9.54	2989	2.80	2114	1.81	9314	7.10
12	28847	3222	1811	5548	2387	5.08	2554	2.39	1702	1.45	9496	7.24
13	18294	2484	1390	4303	1543	3.28	2297	2.15	1477	1.26	11523	8.79
14	13051	1951	1085	3407	1094	2.33	1552	1.45	1047	.89	10774	8.22
15	9932	1556	859	2740	735	1.56	1317	1.23	855	.73	7922	6.04
16	7873	1252	688	2231	593	1.26	1084	1.01	660	.56	8166	6.23
17	6419	1024	557	1835	428	.91	766	.72	453	.39	6675	5.09
18	5343	841	454	1522	351	.75	608	.57	347	.30	4622	3.52
19	4517	696	373	1272	272	.58	462	.43	263	.22	5103	3.89
20	3867	580	308	1068	239	.51	342	.32	181	.15	2948	2.25
21	3344	486	256	902	152	.32	271	.25	141	.12	1904	1.45
22	2916	409	214	765	134	.29	169	.16	102	.09	1475	1.12
23	2561	345	180	652	100	.21	131	.12	67	.06	927	.71
24	2262	293	151	557	74	.16	70	.07	55	.05	1319	1.01
25	2008	249	128	477	57	.12	69	.06	30	.03	936	.71
26	1791	213	108	410	45	.10	44	.04	23	.02	731	.56
27	1603	182	92	354	27	.06	30	.03	13	.01	924	.70
28	1440	156	79	305	17	.04	16	.01	9	.01	291	.22
29	1298	134	67	264	15	.03	10	.01	5	.00	111	.08
30	1173	116	57	229	6	.01	7	.01	8	.01	50	.04
31	1063	100	49	199	4	.01	6	.01	2	.00	24	.02
32	965	86	42	173	2	.00	4	.00	1	.00	21	.02
33	878	75	37	151	3	.01	3	.00	0	.00	15	.01
34	800	65	32	132	2	.00	1	.00	0	.00	11	.01
35	731	56	27	115	1	.00	0	.00	0	.00	1	.00
36	668	49	24	101	0	.00	0	.00	0	.00	0	.00
37	612	43	20	88	0	.00	0	.00	0	.00	0	.00
38	562	37	18	77								
39	516	33	15	68								
40	474	28	13	60								

Table B-6
1993 Internal Data Summary

	Dwelling Units									Employment						
zone	Exc	A Ave	Ave	B Ave	Poor	Taxi	Truck	Auto	DUs	Indus	Ret	HRet	O&I	Serv	Othr	Total
1	0	0	0	0	0	0	18	4	0	29	0	1	0	5	0	35
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	18	3	55	0	0	5	76	0	0	0	0	12	0	12
4	0	0	2	25	32	0	25	24	59	34	249	22	11	58	249	374
5	0	2	24	174	6	0	9	14	206	31	25	0	0	107	0	163
6	0	3	90	51	3	0	24	35	147	35	62	2	23	111	0	233
7	0	2	147	114	16	0	0	2	279	0	3	8	0	10	0	21
8	0	6	185	139	3	0	3	10	333	2	43	22	18	43	0	128
9	0	18	97	167	0	0	31	0	282	44	56	12	0	53	0	165
10	0	0	17	360	67	0	6	39	444	19	17	0	99	37	0	172
11	0	0	3	8	0	0	7	89	11	6104	384	90	136	41	384	6755
12	0	0	28	187	26	0	1	0	241	2	0	0	0	5	0	7
13	0	1	40	295	63	6	0	8	399	16	20	21	28	52	0	137
14	0	0	49	268	88	0	8	6	405	15	14	18	4	46	0	97
15	0	2	73	103	25	0	0	0	203	34	1	11	0	6	0	52
16	0	0	9	61	21	0	36	1	91	106	56	34	1	24	0	221
17	0	3	31	120	19	0	10	6	173	18	30	85	0	54	0	187
18	0	0	28	157	12	0	2	4	197	3	29	47	24	119	0	222
19	1	53	97	248	24	0	2	0	423	0	10	0	0	5	0	15
20	0	0	12	739	15	0	14	18	766	32	16	6	36	71	0	161
21	0	0	89	327	5	0	8	6	421	2	0	0	0	24	0	26
22	0	21	112	15	0	0	20	2	148	5	50	13	0	104	0	172
23	0	9	92	66	0	0	0	8	167	7	5	0	0	36	0	48
24	0	0	8	41	0	0	0	0	49	0	0	2	0	0	0	2
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	5	0	8	0	0	0	0	0	8
27	0	0	2	7	0	0	3	71	9	146	104	30	2	97	104	379
28	0	1	41	306	24	0	1	6	372	0	171	0	0	5	171	176
29	0	0	10	385	13	0	4	4	408	447	12	8	0	23	0	490
30	0	0	15	259	14	0	3	10	288	278	13	17	0	4	0	312
31	0	0	0	2	2	0	0	0	4	85	108	70	952	150	108	1365
32	0	0	3	58	0	0	15	6	61	185	20	3	6	21	0	235
33	0	0	9	117	7	0	11	0	133	0	238	8	0	12	238	258
34	0	0	0	225	9	0	0	0	234	0	3	6	0	2	0	11
35	0	0	48	298	0	0	12	14	346	6	154	44	440	65	154	709
36	0	0	0	107	29	0	0	0	136	0	0	0	0	0	0	0
37	0	0	0	72	1	0	16	10	73	24	207	69	104	45	207	449
38	0	0	27	106	59	0	0	0	192	0	0	0	0	0	0	0
39	0	0	6	60	0	0	0	0	66	0	0	0	0	0	0	0
40	0	60	8	7	0	0	0	0	75	0	0	0	0	0	0	0
41	0	64	92	29	0	0	0	0	185	0	3	0	0	0	0	3
42	0	43	81	107	14	0	1	0	245	0	0	0	0	1	0	1
43	1	69	12	148	14	0	0	0	244	0	0	0	0	1	0	1
44	0	0	59	92	29	0	2	10	180	18	15	6	0	10	0	49
45	0	0	29	62	9	0	0	0	100	0	5	0	0	2	0	7
46	0	0	4	67	1	0	0	0	72	0	2	0	0	5	0	7
47	0	0	92	60	6	0	0	0	158	25	0	0	0	5	0	30
48	0	0	9	25	0	0	0	0	34	0	0	0	22	0	0	22
49	0	0	53	100	8	0	0	0	161	0	0	0	0	0	0	0
50	0	0	8	159	47	0	0	0	214	0	0	2	0	0	0	2
51	0	1	59	217	10	0	3	0	287	0	7	7	8	18	0	40
52	0	0	41	80	15	0	5	5	136	21	0	5	0	48	0	74

Table B-6 (con't)
1993 Internal Data Summary

	Dwelling Units									Employment						
zone	Exc	A Ave	Ave	B Ave	Poor	Taxi	Truck	Auto	DUs	Indus	Ret	HRet	O&I	Serv	Othr	Total
53	3	0	8	10	6	0	9	0	27	7	5	0	0	0	0	12
54	0	3	29	79	10	0	0	6	121	0	6	0	3	110	0	119
55	1	18	17	5	0	0	0	0	41	0	0	0	0	0	0	0
56	0	11	20	1	0	0	0	0	32	0	0	0	0	0	0	0
57	1	4	67	83	3	0	0	1	158	0	3	6	5	16	0	30
58	0	1	36	125	13	0	0	0	175	0	0	0	0	0	0	0
59	0	0	33	70	3	0	12	3	106	30	12	10	0	16	0	68
60	0	1	20	139	35	0	0	0	195	0	0	2	0	1	0	3
61	0	6	20	46	14	0	4	1	86	0	4	3	0	9	0	16
62	0	3	51	191	51	0	2	1	296	3	17	87	3	39	0	149
63	0	9	315	213	6	0	11	21	543	532	85	23	68	27	0	735
64	0	0	15	169	7	0	2	0	191	0	1	0	0	5	0	6
65	0	0	19	160	2	0	13	10	181	0	59	84	46	68	0	257
66	0	0	22	76	7	0	5	1	105	0	159	31	3	21	0	214
67	0	13	39	13	0	0	1	2	65	1	42	58	0	18	0	119
68	0	0	155	257	0	0	1	40	412	7	78	136	32	81	0	334
69	0	0	19	15	0	0	0	0	34	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71	0	0	77	85	0	0	12	10	162	6	212	127	4	145	212	494
72	0	0	0	0	0	0	4	23	0	3	42	125	79	262	0	511
73	0	0	0	0	0	0	2	7	0	0	424	111	7	308	424	850
74	0	0	2	3	0	0	0	18	5	0	32	118	72	374	0	596
75	12	24	195	94	6	0	21	57	331	39	107	95	69	135	107	445
76	0	21	146	15	0	0	0	0	182	0	0	0	0	16	0	16
77	0	0	152	69	5	0	1	4	226	0	2	0	0	28	0	30
78	2	11	19	271	21	0	17	25	324	37	27	54	35	98	0	251
79	14	29	49	98	0	0	3	7	190	5	0	4	28	214	0	251
80	1	10	62	190	5	0	7	63	268	293	27	0	17	53	0	390
81	0	3	2	0	0	0	14	211	5	0	0	0	0	0	0	0
82	0	0	2	337	54	0	0	0	393	173	4	0	15	2	0	194
83	1	0	18	277	47	0	0	0	343	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
85	0	0	56	4	0	0	0	0	60	454	0	0	0	0	0	454
86	0	0	69	5	0	0	2	5	74	9	0	0	0	7	0	16
87	13	30	173	67	0	0	0	0	283	0	2	0	0	11	0	13
88	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
89	11	28	62	18	0	0	0	0	119	0	0	0	0	0	0	0
90	15	150	129	70	0	0	0	3	364	53	0	0	0	82	0	135
91	0	0	34	262	42	0	0	3	338	7	17	3	0	30	0	57
92	1	5	37	185	0	0	8	10	228	12	0	0	49	19	0	80
93	0	13	33	8	0	0	11	14	54	33	55	10	2	33	0	133
94	0	2	6	9	1	0	1	4	18	0	0	3	6	88	0	97
95	8	19	21	3	0	0	0	0	51	6	15	0	26	1	0	48
96	0	74	5	0	0	0	0	1	79	36	0	0	0	126	0	162
97	0	0	9	142	1	0	3	1	152	8	0	2	5	14	0	29
98	0	1	19	18	4	0	0	0	42	0	0	0	0	0	0	0
99	1	19	42	8	0	0	0	0	70	0	0	0	0	0	0	0
100	0	0	154	30	1	0	0	0	185	0	0	0	0	0	0	0
101	0	1	20	15	0	0	0	0	36	0	0	0	0	0	0	0
102	0	3	7	3	0	0	0	0	13	4	0	0	0	0	0	4
103	0	4	24	1	0	0	0	0	29	0	0	0	0	0	0	0
104	0	0	1	5	0	0	0	0	6	0	0	0	0	0	0	0

Table B-6 (con't)
1993 Internal Data Summary

	Dwelling Units									Employment						
zone	Exc	A Ave	Ave	B Ave	Poor	Taxi	Truck	Auto	DUs	Indus	Ret	HRet	O&I	Serv	Othr	Total
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
106	0	28	93	38	0	0	0	0	159	2	0	0	0	0	0	2
107	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
108	0	1	11	20	0	0	0	0	32	0	0	0	0	0	0	0
109	0	7	170	175	1	0	1	0	353	0	3	7	0	9	0	19
110	0	1	67	249	6	0	0	0	323	12	1	3	0	0	0	16
111	0	0	29	48	8	0	0	0	85	0	0	0	0	0	0	0
112	0	0	4	2	0	0	0	0	6	0	0	0	0	0	0	0
113	0	0	4	9	1	0	2	0	14	0	3	0	0	0	0	3
114	0	0	28	226	5	0	0	1	259	4	8	0	0	0	0	12
115	0	0	5	16	1	0	0	0	22	0	0	0	0	0	0	0
116	0	0	2	2	0	0	0	0	4	0	0	0	0	0	0	0
117	0	0	3	22	0	0	3	9	25	17	20	5	0	0	0	42
118	0	0	13	10	0	0	0	1	23	1	2	1	0	4	0	8
119	0	1	13	10	0	0	1	0	24	0	3	0	0	0	0	3
120	0	0	10	10	0	0	2	0	20	0	1	15	0	0	0	16
121	0	0	11	157	15	0	1	4	183	365	0	3	0	2	0	370
122	0	0	10	36	3	0	1	10	49	14	2	1	11	0	0	28
123	0	0	16	65	7	2	3	1	88	2	17	0	0	4	0	23
124	0	9	55	103	66	0	0	0	233	28	0	0	0	1	0	29
125	0	13	25	73	15	0	0	30	126	365	2	0	0	0	0	367
126	0	0	23	10	0	0	0	0	33	213	0	5	1	4	0	223
127	0	0	0	4	0	0	0	10	4	2	18	4	22	19	0	65
128	2	16	73	36	5	0	0	0	132	0	2	0	0	1	0	3
129	0	16	82	109	0	0	0	0	207	3	1	0	0	0	0	4
130	1	19	9	0	1	0	0	0	30	0	0	0	0	0	0	0
131	0	0	5	14	0	0	0	0	19	0	0	0	0	0	0	0
132	0	0	31	216	6	0	0	0	253	0	2	3	0	0	0	5
133	0	0	85	35	1	0	4	2	121	8	0	0	0	0	0	8
134	0	0	8	129	17	0	0	0	154	0	6	3	0	0	0	9
135	0	0	6	13	0	0	1	0	19	0	2	0	0	9	0	11
136	0	2	4	11	1	0	0	0	18	0	0	0	0	14	0	14
137	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
138	0	88	96	15	2	0	1	0	201	0	0	0	0	14	0	14
139	0	1	5	68	0	0	1	16	74	42	0	0	0	15	0	57
140	8	87	61	6	5	0	0	0	167	0	0	0	0	0	0	0
141	0	1	51	14	12	0	42	5	78	69	11	10	0	25	0	115
142	0	0	52	106	5	0	2	0	163	8	5	5	0	3	0	21
143	0	0	0	0	0	0	0	0	0	0	322	82	140	14	322	558
144	0	0	0	0	0	0	4	0	0	0	0	65	0	19	0	84
145	0	0	67	182	19	0	0	0	268	0	0	0	0	7	0	7
146	0	0	0	0	0	0	125	12	0	164	0	0	0	0	0	164
147	0	0	2	9	0	0	7	22	11	468	0	2	0	16	0	486
148	0	0	0	0	0	0	0	0	0	0	54	0	0	0	0	54
149	0	0	4	5	0	0	9	9	9	272	58	13	3	28	0	374
150	23	35	46	9	1	0	2	2	114	0	1	3	0	40	0	44
151	2	35	119	8	0	0	5	17	164	0	0	0	0	0	0	0
152	2	2	53	29	0	0	0	0	86	31	22	36	0	20	0	109
153	0	8	24	0	0	0	0	0	32	0	0	3	0	0	0	3
154	0	24	27	2	0	0	0	0	53	0	0	0	0	0	0	0
155	32	16	9	0	0	0	0	0	57	0	0	0	0	0	0	0
156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table B-6 (con't)
1993 Internal Data Summary

	Dwelling Units									Employment						
zone	Exc	A Ave	Ave	B Ave	Poor	Taxi	Truck	Auto	DUs	Indus	Ret	HRet	O&I	Serv	Othr	Total
157	0	0	19	25	0	0	0	0	44	0	0	0	0	0	0	0
158	0	0	0	8	11	0	0	0	19	0	0	0	0	0	0	0
159	0	0	22	35	0	0	0	0	57	0	0	0	0	1	0	1
160	0	0	39	6	0	0	0	0	45	0	0	0	0	0	0	0
161	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0
162	0	0	1	4	0	0	0	0	5	0	3	0	0	0	0	3
163	0	11	51	0	0	0	0	0	62	0	0	0	0	0	0	0
164	1	1	0	26	0	0	6	0	28	8	0	2	0	3	0	13
165	0	0	91	0	0	0	0	0	91	0	0	0	0	0	0	0
166	0	0	20	35	0	0	0	0	55	0	0	0	0	0	0	0
167	0	0	52	2	0	0	0	0	54	0	0	3	0	0	0	3
168	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
169	0	0	1	1	0	0	0	0	2	0	0	0	0	3	0	3
170	0	0	14	6	0	0	0	0	20	0	0	0	0	0	0	0
171	0	0	1	0	0	0	0	0	1	20	0	0	6	3	0	29
172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
173	0	0	30	0	0	0	0	0	30	0	0	0	3	0	0	3
174	0	1	30	2	0	0	0	0	33	0	0	0	0	0	0	0
175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
176	0	0	1	1	0	0	0	0	2	8	0	0	0	0	0	8
177	0	0	17	0	0	0	0	0	17	0	0	0	0	2	0	2
178	0	0	16	12	0	0	0	0	28	3	2	5	0	0	0	10
179	0	0	29	17	0	0	0	0	46	5	0	0	0	3	0	8
180	0	0	4	14	0	0	0	0	18	0	0	0	0	0	0	0
181	0	0	4	27	0	0	0	0	31	0	0	0	0	0	0	0
182	0	0	45	2	0	0	0	0	47	0	0	0	0	0	0	0
183	0	0	6	3	0	0	5	1	9	0	2	0	0	7	0	9
184	0	1	5	5	0	0	0	0	11	0	0	8	0	4	0	12
185	0	0	3	23	0	0	0	0	26	0	0	0	0	0	0	0
186	0	0	11	25	0	0	1	2	36	11	2	0	0	12	0	25
187	0	0	6	11	0	0	0	0	17	0	0	0	0	0	0	0
188	0	0	3	29	0	0	0	0	32	0	0	0	0	0	0	0
189	0	1	13	16	0	0	0	0	30	0	1	0	0	4	0	5
190	0	0	2	3	0	0	0	0	5	0	0	0	0	0	0	0
191	0	0	10	21	0	0	0	0	31	0	0	0	0	0	0	0
192	0	0	12	2	0	0	0	0	14	0	0	0	0	0	0	0
193	0	0	0	18	0	0	0	0	18	0	0	0	0	0	0	0
194	0	0	13	6	0	0	0	0	19	0	0	0	0	2	0	2
195	0	0	8	6	0	0	0	0	14	0	0	0	0	0	0	0
196	0	0	3	0	0	0	0	0	3	0	0	0	0	0	0	0
197	0	1	8	5	2	0	0	0	16	0	0	0	0	0	0	0
198	0	0	6	13	2	0	0	0	21	0	0	0	0	0	0	0
199	0	0	4	2	0	0	0	0	6	0	0	0	0	0	0	0
200	0	0	3	9	0	0	0	0	12	0	0	0	0	0	0	0
201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
202	0	0	4	4	2	0	0	0	10	0	0	0	0	0	0	0
203	0	0	4	10	0	0	0	0	14	0	0	0	0	0	0	0
204	0	0	7	20	10	0	0	0	37	0	0	0	0	0	0	0
205	0	1	13	15	0	0	0	0	29	0	0	0	0	0	0	0
206	0	0	10	36	1	0	0	0	47	0	0	0	0	0	0	0
207	0	7	12	19	3	0	0	0	41	0	0	0	0	0	0	0
208	0	0	15	27	2	0	0	0	44	0	0	0	0	0	0	0

Table B-6 (con't)
1993 Internal Data Summary

	Dwelling Units									Employment						
zone	Exc	A Ave	Ave	B Ave	Poor	Taxi	Truck	Auto	DUs	Indus	Ret	HRet	O&I	Serv	Othr	Total
209	0	1	4	26	0	0	0	0	31	0	0	2	0	1	0	3
210	0	0	1	3	0	0	0	0	4	0	0	0	0	0	0	0
211	0	0	2	1	0	0	0	0	3	0	0	0	0	0	0	0
212	0	39	23	14	0	0	12	0	76	7	0	0	0	0	0	7
213	0	1	8	5	4	0	0	3	18	55	1	0	0	10	0	66
214	2	0	0	14	17	0	0	0	33	0	0	0	0	0	0	0
215	0	1	10	102	15	0	10	11	128	1	31	3	0	11	0	46
216	0	4	134	78	9	0	0	0	225	0	0	0	0	1	0	1
217	0	7	8	8	29	0	15	0	52	0	2	0	0	8	0	10
218	0	4	39	57	18	0	1	1	118	4	48	42	3	15	0	112
219	0	3	15	22	1	0	2	2	41	40	2	0	0	0	0	42
220	0	0	11	25	7	0	0	0	43	0	0	0	0	0	0	0
221	0	1	39	78	6	0	0	0	124	0	14	0	0	6	0	20
222	0	14	66	96	13	0	0	1	189	6	4	26	0	9	0	45
223	1	10	26	53	0	0	2	9	90	22	18	33	41	31	0	145
224	1	31	42	3	0	0	0	0	77	0	0	0	0	0	0	0
225	0	0	5	22	1	0	0	0	28	0	1	2	0	1	0	4
226	0	1	16	33	4	0	0	0	54	0	0	0	0	0	0	0
227	0	6	31	23	0	0	0	7	60	12	8	0	0	0	0	20
228	0	0	4	41	0	0	0	0	45	15	0	0	0	2	0	17
229	0	0	17	98	4	0	0	0	119	0	2	0	0	0	0	2
230	5	10	11	42	3	0	0	0	71	0	0	0	0	0	0	0
231	0	2	0	14	0	0	0	0	16	0	0	0	0	0	0	0
232	0	4	1	8	0	0	0	0	13	0	0	0	0	0	0	0
233	0	0	14	52	9	0	0	0	75	0	0	0	0	0	0	0
234	0	0	39	34	0	0	0	0	73	0	0	0	0	0	0	0
235	0	0	8	5	1	0	0	0	14	0	0	0	0	0	0	0
236	0	0	47	29	2	0	0	0	78	0	0	0	0	0	0	0
237	1	0	4	2	0	0	0	0	7	0	0	0	0	0	0	0
238	1	2	43	55	0	0	0	0	101	0	10	5	0	0	0	15
239	0	0	2	11	0	0	0	2	13	6	0	0	0	0	0	6
240	0	0	19	17	1	0	0	0	37	0	0	0	0	0	0	0
241	0	5	40	14	0	0	0	0	59	0	0	0	0	0	0	0
242	0	0	16	123	10	0	0	0	149	0	6	5	0	2	0	13
243	0	0	11	93	15	0	0	0	119	0	0	0	0	2	0	2
244	0	0	3	6	0	0	0	0	9	0	0	0	0	0	0	0
245	0	0	2	21	2	0	0	0	25	0	0	0	0	0	0	0
246	0	0	7	8	1	0	0	0	16	0	0	2	0	0	0	2
247	0	0	1	1	0	0	0	0	2	0	0	0	0	0	0	0
248	0	0	9	37	8	0	1	1	54	1	3	0	0	0	0	4
249	0	0	12	35	3	0	0	0	50	4	0	0	0	2	0	6
250	0	0	12	57	10	0	0	0	79	0	0	0	0	0	0	0
251	0	2	31	42	2	0	2	25	77	48	3	5	0	9	0	65
252	0	1	29	53	5	0	5	7	88	17	3	0	0	5	0	25
253	0	0	9	38	2	0	0	0	49	0	0	0	0	0	0	0
254	0	0	10	87	17	0	1	0	114	0	2	0	0	2	0	4
255	0	0	9	102	12	0	1	0	123	0	0	2	0	5	0	7
256	1	5	76	95	3	0	11	12	180	9	0	13	0	2	0	24
257	0	1	7	12	0	0	0	0	20	0	0	0	0	1	0	1
258	0	0	4	4	0	0	0	0	8	0	0	0	0	0	0	0
259	1	2	23	1	0	0	0	0	27	0	0	0	0	0	0	0
260	0	0	54	14	1	0	0	0	69	0	0	0	0	0	0	0

Table B-6 (con't)
1993 Internal Data Summary

	Dwelling Units									Employment						
zone	Exc	A Ave	Ave	B Ave	Poor	Taxi	Truck	Auto	DUs	Indus	Ret	HRet	O&I	Serv	Othr	Total
261	3	4	43	4	0	0	0	0	54	0	0	0	0	6	0	6
262	0	20	12	0	0	0	0	0	32	0	0	0	0	0	0	0
263	0	9	25	5	0	0	0	0	39	0	0	0	0	0	0	0
264	0	2	2	18	0	0	0	0	22	0	0	0	0	0	0	0
265	0	9	28	15	0	0	3	0	52	0	0	0	0	5	0	5
266	0	6	14	11	0	0	3	0	31	6	0	0	0	0	0	6
267	0	5	2	19	0	0	0	0	26	0	0	0	0	0	0	0
268	0	2	24	14	0	0	0	6	40	50	2	0	0	26	0	78
269	0	7	23	26	0	0	0	0	56	0	0	0	0	0	0	0
270	0	2	6	4	1	0	0	0	13	0	0	0	0	0	0	0
271	5	6	13	83	12	0	0	0	119	0	3	0	0	0	0	3
272	0	0	10	17	0	0	0	0	27	0	0	0	0	0	0	0
273	0	3	1	3	0	0	0	0	7	0	0	0	0	0	0	0
274	0	8	26	0	0	0	0	0	34	0	0	0	0	0	0	0
275	10	12	12	3	0	0	0	0	37	0	0	0	0	0	0	0
276	0	1	1	2	0	0	0	0	4	0	0	0	0	0	0	0
277	0	0	2	6	0	0	0	0	8	0	0	0	0	0	0	0
278	0	0	0	0	0	0	1	0	0	0	0	4	0	2	0	6
279	0	0	4	3	0	0	374	6	7	0	0	22	0	193	0	215
280	0	0	19	118	0	0	0	0	137	0	0	0	0	0	0	0
281	0	0	33	0	0	0	0	0	33	0	0	0	0	0	0	0
282	0	24	115	34	0	0	3	3	173	8	0	0	0	4	0	12
283	1	7	5	11	0	0	0	0	24	0	0	0	0	3	0	3
284	0	0	26	4	0	0	3	0	30	2	0	0	0	0	0	2
285	0	55	125	7	0	0	0	0	187	0	0	8	0	0	0	8
286	5	22	7	5	0	0	0	0	39	0	0	0	0	0	0	0
287	0	7	43	4	0	0	0	0	54	0	0	0	0	0	0	0
288	0	1	9	5	0	0	9	2	15	45	0	0	0	0	0	45
289	0	0	5	6	0	0	1	0	11	0	0	0	0	22	0	22
290	0	1	6	16	3	0	0	13	26	0	0	2	0	27	0	29
291	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	4
292	103	3	19	20	0	0	0	0	145	0	0	0	0	0	0	0
293	0	0	0	0	0	0	2	0	0	5	127	9	0	143	127	284
294	0	0	8	15	1	0	1	5	24	4	29	3	0	4	0	40
295	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
296	0	0	24	8	1	0	0	1	33	2	200	0	0	5	200	207
297	0	0	3	479	0	0	0	0	482	0	0	0	0	0	0	0
298	0	0	17	26	0	0	1	18	43	0	9	6	0	122	0	137
299	0	1	3	1	0	0	1	0	5	5	0	0	0	0	0	5
300	13	74	142	0	0	0	0	0	229	0	0	0	0	0	0	0
301	201	13	112	0	0	0	0	0	326	0	0	0	0	0	0	0
302	0	2	6	5	0	0	0	0	13	0	0	0	0	0	0	0
303	117	0	0	0	0	0	0	0	117	0	0	0	0	0	0	0
304	0	0	5	8	0	0	0	0	13	0	0	0	0	0	0	0
305	0	0	54	174	5	0	0	0	233	0	2	0	0	4	0	6
306	0	0	6	4	0	0	0	5	10	314	0	3	0	5	0	322
307	8	14	16	4	0	0	8	29	42	135	0	0	0	12	0	147
308	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
309	0	76	32	85	31	0	0	0	224	0	0	10	0	2	0	12
310	0	0	70	133	1	0	0	0	204	0	0	1	0	0	0	1
311	0	0	1	66	17	0	0	0	84	0	0	0	0	0	0	0
312	2	102	71	0	0	0	0	0	175	0	0	0	0	0	0	0

Table B-6 (con't)
1993 Internal Data Summary

	Dwelling Units									Employment						
zone	Exc	A Ave	Ave	B Ave	Poor	Taxi	Truck	Auto	DUs	Indus	Ret	HRet	O&I	Serv	Othr	Total
313	0	0	11	10	0	0	0	0	21	0	0	0	0	0	0	0
314	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
315	0	0	7	3	10	0	0	10	20	0	0	0	0	2	0	2
316	23	59	4	0	0	0	0	1	86	0	0	0	0	60	0	60
317	0	0	6	7	0	0	0	0	13	0	0	0	0	0	0	0
318	0	0	1	4	0	1	8	5	5	135	0	20	0	0	0	155
319	0	0	0	0	0	0	25	7	0	19	90	108	11	27	0	255
320	0	0	0	0	0	0	0	0	0	1500	0	0	0	0	0	1500
321	0	0	18	10	0	0	0	0	28	0	0	0	0	5	0	5
322	26	76	90	0	0	0	0	0	192	0	0	0	0	0	0	0
323	0	0	0	0	0	0	41	0	0	0	0	0	0	0	0	0
324	0	0	0	0	0	0	0	0	0	0	0	3	110	154	0	267
325	0	0	9	15	0	0	5	2	24	40	0	0	0	0	0	40
326	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	15
327	0	0	2	2	0	0	0	0	4	75	29	0	3	11	0	118
328	0	0	24	56	0	0	0	0	80	0	0	0	0	0	0	0
329	0	0	40	9	0	0	0	0	49	0	0	0	0	0	0	0
330	0	8	25	37	2	0	0	0	72	0	0	0	0	0	0	0
331	0	0	2	8	0	0	0	0	10	0	0	0	0	0	0	0
332	0	0	127	1	0	0	0	0	128	0	0	0	0	0	0	0
333	0	0	93	133	10	0	0	0	236	0	0	0	0	2	0	2
334	0	5	26	113	5	0	0	0	149	0	4	37	0	13	0	54
335	0	13	272	6	0	0	0	0	291	0	4	0	0	0	0	4
336	0	0	0	42	0	0	0	3	42	0	0	0	0	9	0	9
337	0	0	0	42	0	0	5	0	42	0	0	0	0	6	0	6
338	0	0	2	14	0	0	0	0	16	0	0	0	0	0	0	0
339	0	0	4	0	0	0	0	2	4	0	5	0	0	8	0	13
340	0	0	5	8	0	0	2	2	13	0	0	0	0	16	0	16
341	0	0	0	0	0	0	0	3	0	37	0	0	0	0	0	37
342	0	0	9	3	0	0	32	2	12	123	0	0	0	0	0	123
343	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
344	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
345	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
346	0	0	5	0	0	0	0	0	5	0	0	0	0	0	0	0
347	0	0	0	0	0	0	15	5	0	6	42	0	0	0	0	48
348	0	1	1	1	0	0	4	5	3	0	0	0	15	7	0	22
349	0	0	49	49	4	0	6	0	102	0	0	0	0	11	0	11
350	0	0	12	1	0	0	0	0	13	0	0	0	0	0	0	0
351	0	0	12	3	0	0	0	0	15	0	0	0	0	0	0	0
352	0	3	55	11	0	0	0	0	69	0	0	0	0	0	0	0
353	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
354	0	12	17	14	0	0	0	0	43	0	0	0	0	0	0	0
355	0	2	2	2	0	0	0	0	6	0	0	0	0	0	0	0
356	0	0	59	17	0	0	0	0	76	0	0	0	0	4	0	4
357	0	1	0	7	0	0	0	0	8	0	0	0	0	5	0	5
358	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	6
359	0	0	7	38	1	0	0	0	46	0	0	0	0	0	0	0
360	0	1	100	54	1	0	4	1	156	42	0	0	0	0	0	42
361	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
362	0	57	87	39	0	0	0	0	183	0	0	0	0	0	0	0
363	0	0	7	16	0	0	0	0	23	0	0	0	0	0	0	0
364	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table B-6 (con't)
1993 Internal Data Summary

	Dwelling Units									Employment						
zone	Exc	A Ave	Ave	B Ave	Poor	Taxi	Truck	Auto	DUs	Indus	Ret	HRet	O&I	Serv	Othr	Total
365	0	1	67	14	0	0	7	0	82	0	0	0	15	0	0	15
366	0	0	33	1	0	0	0	0	34	0	0	0	0	0	0	0
367	0	27	54	0	0	0	3	2	81	6	67	17	4	14	0	108
368	0	50	17	0	0	0	0	0	67	0	0	0	0	0	0	0
369	0	2	5	141	0	0	0	0	148	0	0	0	0	0	0	0
370	0	4	3	25	1	0	0	0	33	0	0	0	0	0	0	0
371	0	1	7	13	1	0	0	0	22	0	0	0	0	0	0	0
372	0	2	9	11	0	0	0	6	22	0	0	0	0	19	0	19
373	0	0	6	7	0	0	0	0	13	0	0	0	0	0	0	0
374	0	35	27	14	0	0	0	0	76	0	0	0	0	0	0	0
375	0	5	66	1	0	0	0	0	72	0	0	0	0	0	0	0
376	0	12	15	6	0	0	0	0	33	0	0	0	0	0	0	0
377	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
378	0	0	10	5	1	0	0	0	16	0	0	0	0	0	0	0
379	0	0	15	12	0	0	0	0	27	0	0	0	0	0	0	0
380	0	1	8	7	0	0	0	2	16	0	9	0	0	3	0	12
381	0	0	8	1	0	0	0	0	9	0	0	0	0	0	0	0
382	0	0	14	5	0	0	0	0	19	0	0	2	0	0	0	2
383	0	0	19	140	0	0	0	0	159	0	0	2	0	0	0	2
384	0	4	0	0	0	0	0	0	4	0	0	0	0	0	0	0
385	0	1	5	9	0	0	0	0	15	0	0	0	0	0	0	0
386	0	1	9	4	0	0	0	0	14	0	0	0	0	0	0	0
387	0	0	4	73	1	0	0	0	78	0	0	0	0	0	0	0
388	0	0	3	63	1	0	0	0	67	0	0	0	0	0	0	0
389	0	0	1	1	0	0	0	13	2	35	0	0	0	0	0	35
	687	2347	10528	18333	1716	9	1325	1368	33611	14529	4925	2445	2882	5408	2807	30189

Table B-7
2020 Internal Data Summary

	Dwelling Units									Employment						
zone	Exc	A Ave	Ave	B Ave	Poor	Taxi	Truck	Auto	DUs	Indus	Ret	HRet	O&I	Serv	Othr	Total
1	0	0	0	30	30	0	26	12	60	142	0	1	25	43	0	211
2	0	0	35	25	0	0	4	5	60	100	0	0	0	0	0	100
3	0	0	73	28	55	0	13	18	156	0	100	75	75	60	100	310
4	0	0	62	25	32	0	29	29	119	120	204	50	11	90	204	475
5	0	12	50	182	6	0	15	30	250	70	25	0	55	150	0	300
6	0	3	90	81	3	0	24	35	177	35	62	2	23	111	0	233
7	0	2	157	159	16	0	0	2	334	0	3	8	0	10	0	21
8	0	6	185	139	3	0	3	10	333	2	43	22	18	43	0	128
9	0	18	97	167	0	0	32	1	282	44	56	33	5	53	0	191
10	0	0	17	360	67	0	6	39	444	19	17	2	105	37	0	180
11	0	0	3	8	0	0	12	95	11	6104	444	90	181	61	444	6880
12	0	0	28	187	26	0	1	0	241	2	0	0	0	5	0	7
13	0	1	60	295	63	0	0	8	419	16	20	21	28	52	0	137
14	0	0	69	268	88	0	8	6	425	15	14	18	4	46	0	97
15	0	2	73	103	25	0	0	0	203	34	1	11	0	6	0	52
16	0	0	9	61	21	0	47	13	91	106	306	34	3	28	306	477
17	0	3	31	120	19	0	11	7	173	18	30	101	1	54	0	204
18	0	0	28	157	12	0	3	5	197	3	29	63	25	119	0	239
19	1	53	97	248	24	0	3	1	423	0	10	16	0	6	0	32
20	0	0	12	739	15	0	20	24	766	32	16	117	52	79	0	296
21	0	0	89	327	5	0	9	7	421	2	0	13	2	25	0	42
22	0	21	112	15	0	0	21	3	148	5	50	26	2	105	0	188
23	0	9	92	66	0	0	0	8	167	7	5	0	0	36	0	48
24	0	0	8	41	0	0	0	0	49	0	0	2	0	0	0	2
25	0	10	30	5	0	0	3	3	45	0	0	25	10	40	0	75
26	0	10	35	0	0	0	10	15	45	8	42	20	80	80	0	230
27	0	10	42	7	0	0	7	75	59	140	100	70	70	80	100	460
28	0	5	40	300	25	0	5	10	370	15	120	40	40	50	120	265
29	0	10	15	380	15	0	8	8	420	425	10	20	55	75	0	585
30	0	10	25	260	15	0	5	12	310	250	13	30	20	37	0	350
31	0	25	50	2	2	0	2	202	79	100	90	90	960	175	90	1415
32	0	50	51	68	5	0	20	11	174	190	20	18	52	60	0	340
33	0	0	20	120	10	0	18	7	150	75	180	40	50	70	180	415
34	0	0	45	180	9	0	12	12	234	50	80	6	59	90	0	285
35	0	0	40	80	220	0	10	12	340	50	120	90	320	90	120	670
36	0	0	35	87	18	0	7	7	140	45	0	50	20	35	0	150
37	0	0	58	110	1	0	23	17	169	24	186	175	115	95	186	595
38	0	50	80	76	44	0	11	11	250	0	0	50	100	100	0	250
39	0	0	86	60	0	0	0	0	146	0	0	0	0	0	0	0
40	0	330	8	7	0	0	0	0	345	0	0	0	0	0	0	0
41	0	414	92	29	0	0	0	0	535	0	3	0	0	0	0	3
42	0	43	81	107	14	0	1	0	245	0	0	0	0	1	0	1
43	1	69	12	148	14	0	0	0	244	0	0	0	0	1	0	1
44	0	0	59	92	29	0	2	10	180	18	15	6	0	10	0	49
45	0	0	29	62	9	0	0	0	100	0	5	0	0	2	0	7
46	0	0	4	67	1	0	0	0	72	0	2	0	0	5	0	7
47	0	0	92	60	6	0	0	0	158	25	0	0	0	5	0	30
48	0	0	9	25	0	0	0	0	34	0	0	0	22	0	0	22
49	0	0	53	100	8	0	0	0	161	0	0	0	0	0	0	0
50	0	0	8	159	47	0	0	0	214	0	0	2	0	0	0	2
51	0	1	59	217	10	0	3	0	287	0	7	7	8	18	0	40
52	0	0	41	80	15	0	5	5	136	21	0	5	0	48	0	74

Table B-7 (con't)
2020 Internal Data Summary

	Dwelling Units									Employment						
zone	Exc	A Ave	Ave	B Ave	Poor	Taxi	Truck	Auto	DUs	Indus	Ret	HRet	O&I	Serv	Othr	Total
53	3	40	8	10	6	0	9	0	67	7	5	0	0	0	0	12
54	0	78	29	79	10	0	0	6	196	0	6	0	3	110	0	119
55	1	23	17	5	0	0	0	0	46	0	0	0	0	0	0	0
56	0	11	20	1	0	0	0	0	32	0	0	0	0	0	0	0
57	1	4	190	83	3	0	0	1	281	0	3	6	5	16	0	30
58	0	1	114	125	13	0	0	0	253	0	0	0	0	0	0	0
59	0	0	55	70	3	0	12	3	128	30	27	10	0	16	0	83
60	0	1	20	139	35	0	1	1	195	0	0	27	0	2	0	29
61	0	6	60	46	14	0	4	3	126	0	4	3	0	9	0	16
62	0	3	51	191	51	0	3	2	296	3	17	103	3	40	0	166
63	0	9	315	213	6	0	12	22	543	532	85	39	69	27	0	752
64	0	0	15	169	7	0	2	0	191	0	1	0	0	5	0	6
65	0	0	19	160	2	0	14	12	181	0	59	105	51	76	0	291
66	0	0	32	76	7	0	6	2	115	0	159	50	8	26	159	243
67	0	13	39	13	0	0	1	2	65	1	42	66	2	19	0	130
68	0	0	155	257	0	0	3	42	412	7	78	161	47	93	0	386
69	0	0	19	15	0	0	0	0	34	0	0	8	2	1	0	11
70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71	0	0	77	85	0	0	31	29	162	6	577	127	49	162	577	921
72	0	10	40	0	0	0	4	23	50	5	55	120	90	250	0	520
73	0	10	40	0	0	0	6	11	50	0	450	120	60	300	450	930
74	0	15	47	3	0	0	14	32	65	25	32	150	200	500	0	907
75	10	20	200	99	6	0	25	61	335	39	121	95	120	150	121	525
76	0	25	145	15	0	0	7	7	185	0	25	30	50	70	0	175
77	0	10	151	69	5	0	6	9	235	0	35	0	40	75	0	150
78	2	16	25	276	21	0	17	25	340	37	27	54	50	90	0	258
79	14	30	50	103	0	0	4	8	197	5	35	4	60	180	0	284
80	1	15	64	190	5	0	8	64	275	250	40	15	40	70	0	415
81	0	5	15	5	10	0	17	15	35	55	0	0	0	20	0	75
82	0	10	20	330	50	0	4	5	410	165	35	20	35	40	0	295
83	1	15	15	270	49	0	7	7	350	0	40	0	60	65	0	165
84	0	20	65	25	0	0	3	3	110	25	0	0	10	41	0	76
85	0	40	106	14	0	0	5	5	160	450	0	15	50	60	0	575
86	0	35	109	5	0	0	7	10	149	9	25	20	35	40	0	129
87	13	30	170	67	0	0	3	3	280	0	2	0	40	46	0	88
88	0	30	25	0	0	0	2	2	55	0	0	0	10	40	0	50
89	15	30	70	18	0	0	3	3	133	0	0	0	35	40	0	75
90	15	150	125	70	0	0	2	5	360	50	0	0	50	70	0	170
91	0	0	34	262	42	0	0	3	338	7	17	3	0	30	0	57
92	1	10	40	180	0	0	13	15	231	12	40	15	70	50	0	187
93	20	80	90	10	0	0	14	17	200	27	55	10	35	70	0	197
94	0	67	66	9	1	0	4	8	143	0	0	15	40	120	0	175
95	8	84	69	3	0	0	5	5	164	8	15	0	70	70	0	163
96	0	54	21	0	0	0	12	14	75	35	60	50	120	180	0	445
97	0	10	60	99	1	0	15	13	170	71	10	6	105	103	0	295
98	10	19	99	28	4	0	12	12	160	89	10	25	63	88	0	275
99	1	39	87	23	0	0	7	7	150	50	10	0	40	50	0	150
100	0	0	174	30	1	0	0	0	205	0	0	0	0	0	0	0
101	0	1	20	15	0	0	0	0	36	0	0	0	0	0	0	0
102	0	33	47	13	0	0	6	6	93	28	0	0	40	50	0	118
103	0	4	59	1	0	0	0	0	64	0	0	0	0	0	0	0
104	0	0	43	5	0	0	0	0	48	0	0	0	0	0	0	0

Table B-7 (con't)
2020 Internal Data Summary

	Dwelling Units									Employment						
zone	Exc	A Ave	Ave	B Ave	Poor	Taxi	Truck	Auto	DUs	Indus	Ret	HRet	O&I	Serv	Othr	Total
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
106	0	28	168	38	0	0	0	0	234	2	0	0	0	0	0	2
107	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
108	0	1	11	20	0	0	0	0	32	0	0	0	0	0	0	0
109	0	7	170	175	1	0	1	0	353	0	3	7	0	9	0	19
110	0	1	67	249	6	0	0	0	323	12	1	3	0	0	0	16
111	0	0	29	48	8	0	0	0	85	0	0	0	0	0	0	0
112	0	0	4	2	0	0	0	0	6	0	0	0	0	0	0	0
113	0	0	4	9	1	0	2	0	14	0	3	0	0	0	0	3
114	0	0	88	226	5	0	0	1	319	4	8	0	0	0	0	12
115	0	0	24	16	1	0	0	0	41	0	0	0	0	0	0	0
116	0	0	55	2	0	0	0	0	57	0	0	0	0	0	0	0
117	0	0	10	22	0	0	3	9	32	27	20	5	0	0	0	52
118	0	0	29	10	0	0	0	1	39	1	2	1	0	4	0	8
119	0	1	24	10	0	0	1	0	35	0	3	0	0	0	0	3
120	0	0	10	24	0	0	5	3	34	15	26	33	0	0	0	74
121	0	0	11	177	15	0	2	5	203	385	0	3	0	2	0	390
122	0	0	10	49	3	0	7	16	62	14	102	1	11	40	102	168
123	0	0	16	78	7	0	3	1	101	2	17	0	0	4	0	23
124	0	9	189	103	66	0	0	0	367	28	0	0	0	1	0	29
125	0	13	120	73	15	0	16	47	221	365	2	0	0	0	0	367
126	0	0	98	10	0	0	0	0	108	213	0	5	1	4	0	223
127	0	0	0	4	0	0	0	10	4	2	18	4	22	19	0	65
128	2	16	91	36	5	0	0	0	150	0	2	0	0	1	0	3
129	0	16	110	109	0	0	0	0	235	3	1	0	0	0	0	4
130	1	19	40	0	1	0	0	0	61	0	0	0	0	0	0	0
131	0	0	65	14	0	0	0	0	79	0	0	0	0	0	0	0
132	0	0	31	216	6	0	0	0	253	0	2	3	0	0	0	5
133	0	0	145	35	1	0	4	2	181	8	0	0	0	0	0	8
134	0	0	8	129	17	0	10	10	154	215	6	11	5	0	0	237
135	0	200	6	13	0	0	1	0	219	0	2	0	0	9	0	11
136	0	192	4	11	1	0	0	0	208	0	0	0	0	14	0	14
137	0	325	0	0	0	0	0	0	325	0	0	0	0	0	0	0
138	0	88	156	95	2	0	6	6	341	75	0	32	18	14	0	139
139	8	17	100	50	0	0	15	31	175	160	0	70	75	75	0	380
140	10	85	111	6	5	0	8	8	217	0	0	50	90	35	0	175
141	0	1	105	42	12	0	51	14	160	90	10	60	75	80	0	315
142	0	0	55	105	5	0	11	9	165	20	65	50	35	55	0	225
143	0	0	35	25	0	0	7	7	60	0	380	110	180	50	380	720
144	0	0	50	0	0	0	16	12	50	0	90	70	90	99	0	349
145	0	0	65	130	25	0	11	11	220	80	0	45	60	70	0	255
146	0	10	30	0	0	0	128	15	40	185	0	0	10	40	0	235
147	0	16	45	14	0	0	15	31	75	475	0	50	80	70	0	675
148	0	30	80	10	0	0	11	12	120	60	60	50	70	70	0	310
149	0	25	55	5	0	0	17	18	85	300	70	60	55	80	0	565
150	10	30	70	9	1	0	6	6	120	0	6	14	40	80	0	140
151	2	35	107	11	0	0	9	21	155	0	0	0	40	40	0	80
152	2	40	83	30	0	0	4	4	155	50	20	60	30	40	0	200
153	15	35	70	5	0	0	5	6	125	25	0	3	50	50	0	128
154	18	30	90	7	0	0	8	8	145	25	0	10	50	90	0	175
155	25	45	95	10	0	0	8	8	175	0	0	15	75	85	0	175
156	0	30	60	10	0	0	10	10	100	60	0	10	65	90	0	225

Table B-7 (con't)
2020 Internal Data Summary

	Dwelling Units									Employment						
zone	Exc	A Ave	Ave	B Ave	Poor	Taxi	Truck	Auto	DUs	Indus	Ret	HRet	O&I	Serv	Othr	Total
157	0	30	75	25	0	0	10	11	130	75	0	10	70	80	0	235
158	15	25	61	18	11	0	6	6	130	50	0	0	25	60	0	135
159	10	35	30	45	0	0	8	8	120	50	0	0	65	65	0	180
160	20	30	100	20	0	0	9	9	170	60	0	40	55	50	0	205
161	10	64	70	6	0	0	10	10	150	55	0	30	70	70	0	225
162	0	55	56	4	0	0	3	3	115	0	3	0	35	40	0	78
163	0	56	84	0	0	0	5	6	140	15	0	20	40	50	0	125
164	15	20	90	25	0	0	11	6	150	35	0	20	35	45	0	135
165	0	30	90	5	0	0	2	2	125	0	0	0	10	40	0	50
166	0	15	80	20	0	0	3	3	115	0	0	0	35	40	0	75
167	0	23	80	7	0	0	5	5	110	25	0	30	35	30	0	120
168	0	20	70	5	0	0	4	4	95	0	0	0	20	60	0	80
169	0	25	64	6	0	0	4	4	95	25	0	10	25	30	0	90
170	15	24	65	11	0	0	4	4	115	25	0	10	30	30	0	95
171	10	25	85	0	0	0	3	3	120	45	0	0	16	43	0	104
172	0	15	75	5	0	0	2	2	95	0	0	0	10	40	0	50
173	15	20	80	0	0	0	5	6	115	50	0	0	28	50	0	128
174	13	20	65	2	0	0	5	5	100	40	0	0	25	40	0	105
175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
176	10	30	54	1	0	0	3	3	95	33	0	0	10	40	0	83
177	15	75	110	15	0	0	8	8	215	65	0	0	50	62	0	177
178	0	15	80	10	0	0	3	3	105	28	2	5	0	50	0	85
179	13	50	110	27	0	0	10	10	200	85	0	20	65	55	0	225
180	0	0	44	14	0	0	0	0	58	0	0	0	0	0	0	0
181	0	0	54	27	0	0	0	0	81	0	0	0	0	0	0	0
182	0	0	45	2	0	0	0	0	47	0	0	0	0	0	0	0
183	0	0	36	3	0	0	5	1	39	0	2	0	0	7	0	9
184	0	1	45	5	0	0	10	10	51	215	0	24	0	4	0	243
185	0	0	3	23	0	0	1	1	26	0	0	25	0	0	0	25
186	0	0	11	25	0	0	1	2	36	11	2	0	0	12	0	25
187	0	0	6	11	0	0	0	0	17	0	0	0	0	0	0	0
188	0	0	3	34	0	0	0	0	37	0	0	0	0	0	0	0
189	0	1	13	19	0	0	0	0	33	0	1	0	0	4	0	5
190	0	0	2	3	0	0	0	0	5	0	0	0	0	0	0	0
191	0	0	10	21	0	0	0	0	31	0	0	0	0	0	0	0
192	0	0	12	5	0	0	0	0	17	0	0	0	0	0	0	0
193	0	0	0	33	0	0	0	0	33	0	0	0	0	0	0	0
194	0	0	26	6	0	0	0	0	32	0	0	0	0	2	0	2
195	0	0	23	6	0	0	0	0	29	0	0	0	0	0	0	0
196	0	0	3	8	0	0	0	0	11	0	0	0	0	0	0	0
197	0	1	8	35	2	0	0	0	46	0	0	0	0	0	0	0
198	0	0	6	41	2	0	0	0	49	0	0	0	0	0	0	0
199	0	0	4	20	0	0	0	0	24	0	0	0	0	0	0	0
200	0	0	3	56	0	0	0	0	59	0	0	0	0	0	0	0
201	0	0	46	0	0	0	0	0	46	0	0	0	0	0	0	0
202	0	0	12	4	2	0	0	0	18	0	0	0	0	0	0	0
203	0	0	16	10	0	0	0	0	26	0	0	0	0	0	0	0
204	0	0	54	20	10	0	0	0	84	0	0	0	0	0	0	0
205	0	1	36	15	0	0	0	0	52	0	0	0	0	0	0	0
206	0	0	19	36	1	0	0	0	56	0	0	0	0	0	0	0
207	0	7	31	19	3	0	0	0	60	0	0	0	0	0	0	0
208	0	0	25	27	2	0	0	0	54	0	0	0	0	0	0	0

Table B-7 (con't)
2020 Internal Data Summary

	Dwelling Units									Employment						
zone	Exc	A Ave	Ave	B Ave	Poor	Taxi	Truck	Auto	DUs	Indus	Ret	HRet	O&I	Serv	Othr	Total
209	0	1	13	26	0	0	0	0	40	0	0	2	0	1	0	3
210	0	0	9	3	0	0	0	0	12	0	0	0	0	0	0	0
211	0	0	2	1	0	0	7	7	3	150	0	0	0	0	0	150
212	0	62	23	14	0	0	12	0	99	7	0	0	0	0	0	7
213	0	1	8	13	4	0	18	21	26	455	1	0	0	10	0	466
214	2	0	0	19	17	0	7	7	38	0	90	75	0	0	0	165
215	0	1	140	102	15	0	17	18	258	151	31	3	0	11	0	196
216	0	4	319	78	9	0	0	0	410	0	0	0	0	1	0	1
217	0	7	8	15	29	0	15	0	59	0	2	0	0	8	0	10
218	0	4	39	67	18	0	2	2	128	4	55	50	3	15	0	127
219	0	198	15	22	1	0	6	7	236	40	2	100	0	0	0	142
220	0	60	11	25	7	0	9	9	103	200	0	0	0	0	0	200
221	0	1	39	91	6	0	0	0	137	0	14	0	0	6	0	20
222	0	14	121	96	13	0	0	1	244	6	4	26	0	9	0	45
223	1	10	26	59	0	0	2	9	96	22	18	33	41	31	0	145
224	1	31	42	42	0	0	0	0	116	0	0	0	0	0	0	0
225	0	0	5	91	1	0	0	0	97	0	1	2	0	1	0	4
226	0	1	16	82	4	0	0	0	103	0	0	0	0	0	0	0
227	0	6	31	124	0	0	0	7	161	12	8	0	0	0	0	20
228	0	0	29	41	0	0	0	0	70	15	0	0	0	2	0	17
229	0	0	40	98	4	0	0	0	142	0	2	0	0	0	0	2
230	5	45	11	42	3	0	0	0	106	0	0	0	0	0	0	0
231	0	2	50	14	0	0	0	0	66	0	0	0	0	0	0	0
232	0	4	14	8	0	0	0	0	26	0	0	0	0	0	0	0
233	0	0	58	52	9	0	0	0	119	0	0	0	0	0	0	0
234	0	0	71	34	0	0	0	0	105	0	0	0	0	0	0	0
235	0	0	8	5	1	0	0	0	14	0	0	0	0	0	0	0
236	0	0	47	29	2	0	0	0	78	0	0	0	0	0	0	0
237	1	0	22	2	0	0	0	0	25	0	0	0	0	0	0	0
238	1	2	77	55	0	0	0	0	135	0	10	5	0	0	0	15
239	0	0	28	11	0	0	0	2	39	6	0	0	0	0	0	6
240	0	0	19	33	1	0	0	0	53	0	0	0	0	0	0	0
241	0	5	46	14	0	0	0	0	65	0	0	0	0	0	0	0
242	0	0	16	166	10	0	0	0	192	0	6	5	0	2	0	13
243	0	0	11	127	15	0	0	0	153	0	0	0	0	2	0	2
244	0	0	3	21	0	0	0	0	24	0	0	0	0	0	0	0
245	0	0	2	44	2	0	0	0	48	0	0	0	0	0	0	0
246	0	0	7	10	1	0	0	0	18	0	0	2	0	0	0	2
247	0	0	1	11	0	0	0	0	12	0	0	0	0	0	0	0
248	0	0	9	77	8	0	1	1	94	1	3	0	0	0	0	4
249	0	0	12	49	3	0	0	0	64	4	0	0	0	2	0	6
250	0	0	12	67	10	0	0	0	89	0	0	0	0	0	0	0
251	0	2	31	82	2	0	2	25	117	48	3	5	0	9	0	65
252	0	1	29	79	5	0	5	7	114	17	3	0	0	5	0	25
253	0	0	9	78	2	0	0	0	89	0	0	0	0	0	0	0
254	0	0	10	124	17	0	1	0	151	0	2	0	0	2	0	4
255	0	0	9	167	12	0	1	0	188	0	0	2	0	5	0	7
256	1	5	76	95	3	0	11	12	180	9	0	13	0	2	0	24
257	0	1	7	12	0	0	0	0	20	0	0	0	0	1	0	1
258	0	0	44	4	0	0	0	0	48	0	0	0	0	0	0	0
259	1	2	23	1	0	0	0	0	27	0	0	0	0	0	0	0
260	0	0	54	14	1	0	0	0	69	0	0	0	0	0	0	0

Table B-7 (con't)
2020 Internal Data Summary

	Dwelling Units									Employment						
zone	Exc	A Ave	Ave	B Ave	Poor	Taxi	Truck	Auto	DUs	Indus	Ret	HRet	O&I	Serv	Othr	Total
261	3	4	43	4	0	0	0	0	54	0	0	0	0	6	0	6
262	0	20	52	0	0	0	0	0	72	0	0	0	0	0	0	0
263	0	9	25	5	0	0	0	0	39	0	0	0	0	0	0	0
264	0	2	72	18	0	0	0	0	92	0	0	0	0	0	0	0
265	0	9	48	15	0	0	3	0	72	0	0	0	0	5	0	5
266	0	6	34	11	0	0	3	0	51	6	0	0	0	0	0	6
267	0	5	22	19	0	0	0	0	46	0	0	0	0	0	0	0
268	0	2	44	14	0	0	0	6	60	50	2	0	0	26	0	78
269	0	7	43	26	0	0	0	0	76	0	0	0	0	0	0	0
270	0	2	26	4	1	0	0	0	33	0	0	0	0	0	0	0
271	5	106	13	83	12	0	13	13	219	200	68	0	22	0	0	290
272	0	250	10	17	0	0	0	0	277	0	0	0	0	0	0	0
273	0	368	1	3	0	0	0	0	372	0	0	0	0	0	0	0
274	0	8	46	0	0	0	0	0	54	0	0	0	0	0	0	0
275	30	362	12	3	0	0	0	0	407	0	0	0	0	0	0	0
276	0	301	1	2	0	0	0	0	304	0	0	0	0	0	0	0
277	0	200	2	6	0	0	2	2	208	47	0	0	0	0	0	47
278	0	70	130	20	0	0	8	7	220	90	0	50	0	25	0	165
279	0	0	4	3	0	0	395	27	7	400	0	22	70	193	0	685
280	0	55	75	65	0	0	8	8	195	80	0	0	50	50	0	180
281	0	80	175	0	0	0	13	13	255	80	0	0	130	70	0	280
282	40	90	300	34	0	0	15	16	464	80	0	70	70	70	0	290
283	10	50	120	20	0	0	13	14	200	75	0	75	75	80	0	305
284	0	73	140	4	0	0	17	14	217	100	0	0	120	90	0	310
285	20	70	240	7	0	0	12	13	337	75	0	75	70	65	0	285
286	20	50	90	5	0	0	30	31	165	410	0	80	100	100	0	690
287	0	7	139	4	0	0	32	33	150	470	0	80	70	100	0	720
288	0	20	120	55	0	0	32	26	195	330	0	75	80	80	0	565
289	0	0	38	41	0	0	28	28	79	440	0	50	75	80	0	645
290	0	21	95	46	3	0	30	44	165	370	30	100	100	120	0	720
291	0	100	80	0	0	0	33	34	180	280	100	100	135	140	100	755
292	60	80	90	40	0	0	15	16	270	70	0	75	110	90	0	345
293	0	53	100	37	0	0	22	21	190	180	100	70	190	200	100	740
294	0	59	120	15	1	0	32	36	195	290	40	85	170	150	0	735
295	30	40	5	0	0	0	29	30	75	180	95	70	160	160	0	665
296	0	80	61	8	1	0	9	11	150	40	180	50	70	80	180	420
297	0	0	83	304	43	0	8	8	430	0	0	35	80	70	0	185
298	0	30	100	40	0	0	12	29	170	120	9	81	80	100	0	390
299	0	79	100	1	0	0	18	17	180	90	20	75	90	110	0	385
300	13	110	207	0	0	0	4	5	330	0	0	30	35	35	0	100
301	180	18	165	45	15	0	5	5	423	0	20	20	40	35	0	115
302	0	85	90	20	0	0	11	11	195	90	0	55	50	50	0	245
303	60	85	75	0	0	0	12	12	220	60	0	70	70	70	0	270
304	0	42	140	8	0	0	11	11	190	70	0	40	70	70	0	250
305	20	50	154	106	5	0	9	10	335	45	20	45	65	45	0	220
306	0	10	60	15	0	0	18	23	85	575	0	40	60	50	0	725
307	25	100	61	4	0	0	17	38	190	160	0	40	70	80	0	350
308	0	30	100	25	25	0	9	10	180	0	0	60	70	80	0	210
309	0	69	50	75	31	0	9	9	225	0	0	60	70	80	0	210
310	0	24	70	110	1	0	9	9	205	35	0	40	50	70	0	195
311	0	15	70	50	10	0	4	4	145	0	0	20	30	30	0	80
312	15	100	60	0	0	0	6	6	175	0	0	30	50	50	0	130

Table B-7 (con't)
2020 Internal Data Summary

	Dwelling Units									Employment						
zone	Exc	A Ave	Ave	B Ave	Poor	Taxi	Truck	Auto	DUs	Indus	Ret	HRet	O&I	Serv	Othr	Total
313	10	40	90	10	0	0	9	10	150	70	0	30	60	50	0	210
314	0	55	80	20	0	0	5	5	155	0	0	20	50	40	0	110
315	0	85	162	3	10	0	14	24	260	120	0	40	70	80	0	310
316	25	90	75	0	0	0	11	13	190	75	0	50	100	90	0	315
317	0	0	49	32	0	0	8	8	81	65	0	0	60	60	0	185
318	0	10	49	4	0	0	17	15	63	200	0	20	80	70	0	370
319	0	100	50	0	0	0	36	18	150	150	90	90	75	90	0	495
320	20	80	70	0	0	0	25	25	170	1950	0	0	50	50	0	2050
321	55	75	90	10	0	0	16	16	230	0	100	80	90	90	100	360
322	60	175	100	0	0	0	11	11	335	0	60	60	60	60	0	240
323	75	110	40	0	0	0	57	16	225	200	0	0	80	80	0	360
324	0	20	35	0	0	0	12	12	55	135	40	55	150	150	0	530
325	0	80	60	15	0	0	22	20	155	220	10	20	90	90	0	430
326	0	110	110	0	0	0	16	17	220	120	0	75	100	90	0	385
327	0	43	80	2	0	0	13	13	125	200	25	25	80	80	0	410
328	40	140	70	55	0	0	11	11	305	0	0	60	100	80	0	240
329	70	240	103	9	0	0	13	13	422	0	35	75	90	90	0	290
330	20	150	66	37	2	0	14	14	275	120	0	50	80	75	0	325
331	30	90	50	10	0	0	9	9	180	85	35	25	25	45	0	215
332	0	60	104	1	0	0	17	17	165	80	50	50	80	130	0	390
333	25	40	85	80	10	0	14	14	240	80	0	50	90	90	0	310
334	0	20	65	90	10	0	9	9	185	60	5	60	60	70	0	255
335	0	80	330	5	0	0	13	13	415	0	57	100	70	70	0	297
336	15	40	35	25	0	0	13	16	115	90	0	50	70	90	0	300
337	0	30	75	60	0	0	13	8	165	0	0	40	70	80	0	190
338	19	70	22	14	0	0	6	6	125	0	0	0	70	70	0	140
339	0	60	50	0	0	0	15	17	110	150	5	60	65	70	0	350
340	0	22	80	8	0	0	17	17	110	120	0	60	80	90	0	350
341	0	20	65	10	0	0	5	9	95	90	0	0	30	40	0	160
342	0	15	80	20	0	0	38	8	115	180	0	0	30	50	0	260
343	0	30	125	20	0	0	5	5	175	0	0	0	55	60	0	115
344	0	30	80	15	0	0	8	8	125	60	0	0	50	70	0	180
345	0	40	70	10	0	0	9	9	120	50	0	50	50	50	0	200
346	10	70	35	0	0	0	18	19	115	180	10	70	80	70	0	410
347	15	55	45	0	0	0	28	18	115	130	35	60	50	60	0	335
348	15	60	39	1	0	0	13	14	115	75	0	45	55	55	0	230
349	0	25	51	45	4	0	16	10	125	60	0	50	60	70	0	240
350	0	20	70	35	0	0	8	9	125	70	0	0	60	60	0	190
351	0	35	77	28	0	0	4	5	140	0	0	0	50	50	0	100
352	0	50	84	36	0	0	4	4	170	0	0	0	35	60	0	95
353	0	30	120	20	0	0	4	4	170	20	0	0	25	45	0	90
354	0	25	95	50	0	0	3	3	170	0	0	0	25	50	0	75
355	0	25	90	20	0	0	3	3	135	0	0	0	25	50	0	75
356	0	20	90	20	0	0	2	2	130	0	0	0	25	20	0	45
357	0	15	70	15	0	0	7	7	100	25	0	35	40	60	0	160
358	0	0	30	0	0	0	3	3	30	0	0	25	20	20	0	65
359	0	0	51	38	1	0	6	6	90	20	0	20	40	60	0	140
360	0	1	90	58	1	0	8	5	150	30	0	40	35	35	0	140
361	0	50	65	5	0	0	6	6	120	50	0	10	25	50	0	135
362	0	50	115	20	0	0	5	5	185	30	0	30	30	25	0	115
363	0	34	75	21	0	0	4	4	130	0	35	30	20	15	0	100
364	0	0	75	0	0	0	4	4	75	0	30	25	20	20	0	95

Table B-7 (con't)
2020 Internal Data Summary

	Dwelling Units									Employment						
zone	Exc	A Ave	Ave	B Ave	Poor	Taxi	Truck	Auto	DUs	Indus	Ret	HRet	O&I	Serv	Othr	Total
365	0	41	60	14	0	0	12	5	115	0	0	35	25	60	0	120
366	0	39	90	1	0	0	4	4	130	0	15	20	20	25	0	80
367	0	55	80	0	0	0	5	4	135	6	60	30	25	29	0	150
368	0	70	55	0	0	0	6	6	125	0	40	25	30	40	0	135
369	0	90	80	70	0	0	5	5	240	0	30	30	30	35	0	125
370	0	25	54	50	1	0	5	5	130	0	25	25	30	30	0	110
371	0	85	71	13	1	0	9	9	170	0	45	45	60	50	0	200
372	0	70	59	11	0	0	8	14	140	50	0	40	40	60	0	190
373	0	58	85	7	0	0	3	3	150	20	0	0	25	25	0	70
374	0	50	90	60	0	0	3	3	200	0	0	0	30	40	0	70
375	0	30	99	11	0	0	3	3	140	0	0	0	25	40	0	65
376	0	35	64	56	0	0	3	3	155	0	0	0	25	40	0	65
377	0	25	90	20	0	0	2	2	135	0	0	0	25	30	0	55
378	0	19	60	20	1	0	4	4	100	30	0	0	30	40	0	100
379	0	25	60	20	0	0	5	5	105	40	0	0	35	40	0	115
380	0	30	60	35	0	0	3	5	125	0	9	0	0	66	0	75
381	0	30	35	50	0	0	7	7	115	80	0	0	30	40	0	150
382	0	30	50	10	0	0	6	6	90	0	25	30	45	40	0	140
383	0	30	55	100	0	0	7	7	185	60	0	25	35	40	0	160
384	0	30	60	35	0	0	4	4	125	25	0	0	25	40	0	90
385	0	25	60	30	0	0	3	3	115	0	0	0	0	75	0	75
386	0	20	55	60	0	0	3	3	135	0	0	0	30	40	0	70
387	0	20	70	39	1	0	3	3	130	0	0	0	25	45	0	70
388	0	25	64	35	1	0	3	3	125	0	0	0	30	30	0	60
389	0	5	40	15	0	0	2	15	60	35	0	30	5	10	0	80
	1420	12084	23332	19762	2047	0	3147	3248	58645	26669	7369	8261	13085	15870	4119	71254

APPENDIX C. RECOMMENDED SUBDIVISION ORDINANCES

Definitions

I. Streets and Roads

A. Rural Roads

1. Principal Arterial - A rural link in a highway system serving travel, and having characteristics indicative of substantial statewide or interstate travel and existing solely to serve traffic. This network would consist of Interstate routes and other routes designated as principal arterials.

2. Minor Arterial - A rural roadway joining cities and larger towns and providing intra-state and inter-county service at relatively high overall travel speeds with minimum interference to through movement.

3. Major Collector - A road which serves major intra-county travel corridors and traffic generators and provides access to the Arterial system.

4. Minor Collector - A road which provides service to small local communities and traffic generators and provides access to the Major Collector system.

5. Local Road - A road which serves primarily to provide access to adjacent land, over relatively short distances.

B. Urban Streets

1. Major Thoroughfares - Major thoroughfares consist of Inter-state, other freeway, expressway, or parkway roads, and major streets that provide for the expeditious movement of high volumes of traffic within and through urban areas.

2. Minor Thoroughfares - Minor thoroughfares perform the function of collecting traffic from local access streets and carrying it to the major thoroughfare system. Minor thoroughfares may be used to supplement the major thoroughfare system by facilitating minor through traffic movements and may also serve abutting property.

3. Local Street - A local street is any street not on a higher order urban system and serves primarily to provide direct access to abutting land.

C. Specific Type Rural or Urban Streets

1. Freeway, expressway, or parkway - Divided multilane roadways designed to carry large volumes of traffic at high speeds. A freeway provides for continuous flow of vehicles with no direct access to abutting property and with access to selected crossroads only by way of interchanges. An expressway is a facility with full or partial control of access and generally with grade separations at major intersections. A parkway is for non-commercial traffic, with full or partial control of access.

2. Residential Collector Street - A local street which serves as a connector street between local residential streets and the thoroughfare system. Residential collector streets typically collect traffic from 100 to 400 dwelling units.

3. Local Residential Street - Cul-de-sacs, loop streets less than 760 meters (2500 ft) in length, or streets less than 1.6 kilometers (1.0 miles) in length that do not connect thoroughfares, or serve major traffic generators, and do not collect traffic from more than 100 dwelling units.

4. Cul-de-sac - A short street having only one end open to traffic and the other end being permanently terminated and a vehicular turn-around provided.

5. Frontage Road - A road that is parallel to a partial or full access controlled facility and provides access to adjacent land.

6. Alley - A strip of land, owned publicly or privately, set aside primarily for vehicular service access to the back side of properties otherwise abutting on a street.

II. Property

A. Building Setback Line - A line parallel to the street in front of which no structure shall be erected.

B. Easement - A grant by the property owner for use by the public, a corporation, or person(s), of a strip of land for a specific purpose.

C. Lot - A portion of a subdivision, or any other parcel of land, which is intended as a unit for transfer of ownership or for development or both. The word "lot" includes the words "plat" and "parcel".

III. Subdivision

A. Subdivider - Any person, firm, corporation or official agent thereof, who subdivides of develops any land deemed to be a subdivision.

B. Subdivision - All divisions of a tract or parcel of land into two or more lots, building sites, or other divisions for the purpose, immediate or future, of sale or building development and all divisions of land involving the dedication of a new street or change in existing streets; provided, however, that the following shall not be included within this definition nor subject to these regulations: (1) the combination or re-combination of portions of previously platted lots where the total number of lots is not increased and the resultant lots are equal to or exceed the standards contained herein; (2) the division of land into parcels greater than 4 hectares (10 acres) where no street right-of-way dedication is involved, (3) the public acquisition, by purchase, of strips of land for the widening or the opening of streets; (4) the division of a tract in single ownership whose entire area is no greater than 0.8 hectares (2 acres) into not more than three lots, where no street right-of-way dedication is involved and where the resultant lots are equal to or exceed the standards contained herein.

C. Dedication - A gift, by the owner, of his property to another party without any consideration being given for the transfer. The dedication is made by written instrument and is completed with an acceptance.

D. Reservation - Reservation of land does not involve any transfer of property rights. It constitutes an obligation to keep property free from development for a stated period of time.

Design Standards

I. Streets and Roads

The design of all roads within the Planning Area shall be in accordance with the accepted policies of the North Carolina Department of Transportation, Division of Highways, as taken or modified from the American Association of State Highway Officials' (AASHTO) manuals.

The provision of street rights-of-way shall conform and meet the recommendations of the Thoroughfare Plan, as adopted by the municipality.

The proposed street layout shall be coordinated with the existing street system of the surrounding area. Normally the proposed streets should be the extension of existing streets if possible.

A. Right-of-way Widths - Right-of-way (ROW) widths shall not be less than the following and shall apply except in those cases where ROW requirements have been specifically set out in the Thoroughfare Plan.

	Min. ROW	
1. Rural		
a. Principle Arterial		
Freeways	105 m	(350 ft)
Other	60 m	(200 ft)
b. Minor Arterial	30 m	(100 ft)
c. Major Collector	30 m	(100 ft)
d. Minor Collector	24 m	(80 ft)
e. Local Road	18 m[1]	(60 ft)
2. Urban		
a. Major Thoroughfare other than Freeway and Expressway	27 m	(90 ft)
b. Minor Thoroughfare	21 m	(70 ft)
c. Local Street	18 m[1]	(60 ft)
d. Cul-de-sac	Variable[2]	

The subdivider will only be required to dedicate a maximum of 30 meters (100 ft) of right-of-way. In cases where over 30 meters (100 ft) of right-of-way is desired, the subdivider will be required only to reserve the amount in excess of 30 meters (100 ft). On all cases in which right-of-way is sought for a fully controlled access facility, the subdivider will only be required to make a reservation. It is strongly recommended that subdivisions provide access to properties from internal streets, and that direct property access to major thoroughfares, principle and minor arterials, and major collectors be avoided. Direct property access to minor thoroughfares is also undesirable.

A partial width right-of-way, not less than 18 meters (60 ft) in width, may be dedicated when

---

[1] The desirable minimum right-of-way (ROW) is 18 meters (60 ft). If curb and gutter is provided, 15 meters (50 ft) of ROW is adequate on local residential streets.

[2] The ROW dimension will depend on radius used for vehicular turn around. Distance from edge of pavement of turn around to ROW should not be less than distance from edge of pavement to ROW on street approaching turn around.

adjoining undeveloped property that is owned or controlled by the subdivider; provided that the width of a partial dedication be such as to permit the installation of such facilities as may be necessary to serve abutting lots. When the said adjoining property is sub-divided, the remainder of the full required right-of-way shall be dedicated.

B. Street Widths - Widths for street and road classifications other than local shall be as recommended by the Thoroughfare Plan. Width of local roads and streets shall be as follows:

1. Local Residential
   Curb and Gutter section: 7.8 meters (26 ft), face to face of curb
   Shoulder section: 6.0 meters (20 ft) to edge of pavement, 1.2 meters (4 ft) for shoulders

2. Residential Collector

   Curb and Gutter section: 10.2 meters (34 ft), face to face of curb
   Shoulder section: 6.0 meters (20 ft) to edge of pavement, 1.8 meters (6 ft) for shoulders

C. Geometric Characteristics - The standards outlined below shall apply to all subdivision streets proposed for addition to the State Highway System or Municipal Street System. In cases where a subdivision is sought adjacent to a proposed thoroughfare corridor, the requirements of dedication and reservation discussed under Right-of-Way shall apply.

1. Design Speed - The design speed for a roadway should be a minimum of 10 km/h (5 mph) greater than the posted speed limit. The design speeds for subdivision type streets shall be:

DESIGN SPEEDS (METRIC)			
Facility Type	Design Speed km/h Desirable	Minimum Level	Rolling
RURAL			
Minor Collector Roads (ADT Over 2000)	100	80	60
Local roads including Residential Collectors and Local Residential (ADT Over 400)	80	80	60
URBAN			
Major Thoroughfares other than Freeway or Expressway	100	60	60
Minor Thoroughfares	100	50	50
Local Streets	50	50	30

DESIGN SPEEDS (ENGLISH)			
Facility Type	Design Speed mph Desirable	Minimum Level	Rolling
RURAL			
Minor Collector Roads (ADT Over 2000)	60	50	40
Local roads including Residential Collectors and Local Residential (ADT Over 400)	50	* 50	* 40
URBAN			
Major Thoroughfares other than Freeway or Expressway	60	50	40
Minor Thoroughfares	40	30	30
Local Streets	30	**30	**20

* Based on ADT of 400-750. Where roads serve a limited area and small number of units, can reduce min design speed.

**Based on projected ADT of 50-250.
(Reference NCDOT Roadway Design Manual page 1-1B)

2. Maximum and Minimum Grades

a. The maximum grades in percent shall be:

MAXIMUM VERTICAL GRADE (METRIC)				
Facility Type	Design Speed (km/h)	Maximum Grade (Percent) Flat	Rolling	Mountainous
RURAL				
Minor Collector Roads*	30	7	10	12
	50	7	9	10
	65	7	8	10
	80	6	7	9
	100	5	6	8
	110	4	5	6
Local roads including Residential Collectors and Local Residential Streets*	30	-	11	16
	50	7	10	14
	65	7	9	12
	80	6	8	10
	100	5	6	-
URBAN				
Major Thoroughfares other than Freeway or Expressway	50	8	9	11
	65	7	8	10
	80	6	7	9
	100	5	6	8
Minor Thoroughfares*	30	9	12	14
	50	9	11	12
	65	9	10	12
	80	7	8	10
	100	6	7	9
	110	5	6	7
Local Streets*	30	-	11	16
	50	7	10	14
	65	7	9	12
	80	6	8	10
	100	5	6	-

* For streets and roads with projected annual average daily traffic less than 250 or short grades less than 150 meters (500 ft) long, grades may be 2% steeper than the values in the above table.

(Reference NCDOT Roadway Metric Design Manual page 1-12 T-3)

MAXIMUM VERTICAL GRADE (ENGLISH)				
Facility Type	Design Speed (mph)	Maximum Grade (Percent) Flat	Rolling	Mountainous
RURAL				
Minor Collector Roads*	20	7	10	12
	30	7	9	10
	40	7	8	10
	50	6	7	9
	60	5	6	8
	70	4	5	6
Local roads including Residential Collectors and Local Residential Streets*	20	-	11	16
	30	7	10	14
	40	7	9	12
	50	6	8	10
	60	5	6	-
URBAN				
Major Thoroughfares other than Freeway or Expressway	30	8	9	11
	40	7	8	10
	50	6	7	9
	60	5	6	8
Minor Thoroughfares*	20	9	12	14
	30	9	11	12
	40	9	10	12
	50	7	8	10
	60	6	7	9
	70	5	6	7
Local Streets*	20	-	11	16
	30	7	10	14
	40	7	9	12
	50	6	8	10
	60	5	6	-

b. Minimum grade should not be less than 0.5% .

c. Grades for 30 meters (100 ft) each way from intersections (measured from edge of pavement) should not exceed 5%.

---

* For streets and roads with projected annual average daily traffic less than 250 or short grades less than 150 meters (500 ft) long, grades may be 2% steeper than the values in the above table.

(Reference NCDOT Roadway Design Manual page 1-12 T-3)

3. Minimum Sight Distance - In the interest of public safety, no less than the minimum sight distance applicable shall be provided. Vertical curves that connect each change in grade shall be provided and calculated using the following parameters:

SIGHT DISTANCE (METRIC)					
Design Speed (km/h)	30	50	60	90	100
Stopping Sight Distance					
Minimum (meters)	29.6	57.4	74.3	131.2	157.0
Desirable (meters)	30	70	90	170	210
Minimum K* Value for:					
Crest curve	3	9	14	43	62
Sag curve	4	11	15	30	37
Passing Sight Distance:					
Minimum Passing Dist for two lanes, in m	*	*	*	*	*

(General practice calls for vertical curves to be multiples of 10 meters. Calculated lengths shall be rounded up in each case.)
* Currently under revision.
(Reference NCDOT Roadway Metric Design Manual page 1-12 T-1)

SIGHT DISTANCE (ENGLISH)				
Design Speed, MPH	30	40	50	60
Stopping Sight Distance:				
Minimum (ft.)	200	275	400	525
Desirable (ft.)	200	325	475	650
Minimum K* Value for:				
Crest Curve	30	60	110	190
Sag Curve	40	60	90	120
Passing Sight Distance:				
Minimum Passing Distance for 2 lanes, in feet	1,100	1,500	1,800	2,100

(General practice calls for vertical curves to be multiples of 50 feet. Calculated lengths shall be rounded up in each case.)
(Reference NCDOT Roadway Design Manual page 1-12 T-1)

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* K is a coefficient by which the algebraic difference in grade may be multiplied to determine the length of the vertical curve which will provide the desired sight distance. Sight distance provided for stopped vehicles at intersections should be in accordance with "A Policy on Geometric Design of Highways and Streets, 1990".

4. The "Superelevation Table" shown below shows the minimum radius and the related maximum superelevation for design speeds. The maximum rate of roadway superelevation (e) for rural roads with no curb and gutter is 0.08. The maximum rate of superelevation for urban streets with curb and gutter is 0.06, with 0.04 being desirable.

SUPERELEVATION TABLE (METRIC)		
Design Speed	Maximum e*	Minimum Radius m
50 km/h	0.04	100
65	0.04	175
80	0.04	280
100	0.04	490
50	0.06	90
65	0.06	160
80	0.06	250
100	0.06	435
50	0.08	80
65	0.08	145
80	0.08	230
100	0.08	395

e = rate of roadway superelevation, meter per meter

SUPERELEVATION TABLE (ENGLISH)			
Design Speed	Maximum e*	Minimum Radius ft.	Max. Deg. of Curve
30 mph	0.04	302	19 00′
40	0.04	573	10 00′
50	0.04	955	6 00′
60	0.04	1,637	3 45′
30	0.06	273	21 00′
40	0.06	521	11 15′
50	0.06	955	6 45
60	0.06	1,432	4 15′
30	0.08	260	22 45′
40	0.08	477	12 15′
50	0.08	819	7 30′
60	0.08	1,146	4 45′

* e = rate of roadway superelevation, foot per foot
(Reference NCDOT Roadway Design Manual page 1-12 T-6 thru T-8)

D. Intersections

1. Streets shall be laid out so as to intersect as nearly as possible at right angles, and no street should intersect any other street at an angle less than sixty-five (65) degrees.

2. Property lines at intersections should be set so that the distance from the edge of pavement, of the street turnout, to the property line will be at least as great as the distance from the edge of pavement to the property line along the intersecting streets. This property line can be established as a radius or as a sight triangle. Greater offsets from the edge of pavement to the property lines will be required, if necessary, to provide sight distance for the stopped vehicle on the side street.

3. Off-set intersections are to be avoided. Intersections which cannot be aligned should be separated by a minimum length of 60 meters (200 ft) between survey center lines.

E. Cul-de-sacs

Cul-de-sacs shall not be more than 150 meters (500 ft) in length. The distance from the edge of pavement on the vehicular turn around to the right-of-way line should not be less than the distance from the edge of pavement to right-of-way line on the street approaching the turn around. Cul-de-sacs should not be used to avoid connection with an existing street or to avoid the extension of an important street.

F. Alleys

1. Alleys shall be required to serve lots used for commercial and industrial purposes except that this requirement may be waived where other definite and assured provisions are made for service access. Alleys shall not be provided in residential subdivisions unless necessitated by unusual circumstances.

2. The width of an alley shall be at least 6.0 meters (20 ft).

3. Dead end alleys shall be avoided where possible, but if unavoidable, shall be provided with adequate turn around facilities at the dead end as may be required by the Planning Board.

G. Permits For Connection To State Roads

An approved permit is required for connection to any existing state system road. This permit is required prior to any construction on the street or road. The application is available at the office of the District Engineer of the Division of Highways.

H. Offsets To Utility Poles

Poles for overhead utilities should be located clear of roadway shoulders, preferably a minimum of at least 9.0 meters (30 ft) from the edge of pavement. On streets with curb and gutter, utility poles shall be set back a minimum distance of 1.8 meters (6 ft) from the face of curb.

I. Wheel Chair Ramps

All street curbs being constructed or reconstructed for maintenance purposes, traffic operations, repairs, correction of utilities, or altered for any reason, shall provide wheelchair ramps for the physically handicapped at intersections where both curb and gutter and sidewalks are provided and at other major points of pedestrian flow.

J. Horizontal Width on Bridge Deck

1. The clear roadway widths for new and reconstructed bridges serving 2 lane, 2 way traffic should be as follows:

a. Shoulder section approach

i. Under 800 ADT design year

Minimum 8.4 meters (28 ft) width face to face of parapets, rails, or pavement width plus 3.0 meters (10 ft), whichever is greater.

ii. 800 - 2000 ADT design year

Minimum 10.2 meters (34 ft) width face to face of parapets, rails, or pavement width plus 3.6 meters (12 ft), whichever is greater.

iii. Over 2000 ADT design year

Minimum width of 12 meters (40 ft), desirable width of 13.2 meters (44 ft) width face to face of parapets or rails.

b. Curb and gutter approach

i. Under 800 ADT design year

Minimum 7.2 meters (24 ft) face to face of curbs.

ii. Over 800 ADT design year

Width of approach pavement measured face to face of curbs.

Where curb and gutter sections are used on roadway approaches, curbs on bridges shall match the curbs on approaches in height, in width of face to face of curbs, and in crown drop. The distance from face of curb to face of parapet or rail shall be a minimum of 450 millimeters (1' 6"), or greater if sidewalks are required.

2. The clear roadway widths for new and reconstructed bridges having 4 or more lanes serving undivided two-way traffic should be as follows:

   a. Shoulder section approach - Width of approach pavement plus width of usable shoulders on the approach left and right. (Shoulder width 2.4 m (8 ft) minimum, 3.0 m (10 ft) desirable.)

   b. Curb and gutter approach - Width of approach pavement measured face to face of curbs.

Note: English equivalents are printed in this report merely as a guide. The English measurements were not meant to represent exact conversions, and should not be used for standards, regulations, or construction. The tables in this section were taken from the Roadway Design Metric Design Manual. In the event of conflicting information, the Standard Specifications for Roads and Structures and the Roadway Design Metric Design Manual should serve as the standard.

APPENDIX D. SUPPLEMENTARY TRAVEL STUDIES

In addition to the extensive computer modeling process there are additional methods of measuring travel and levels of traffic congestion in an area. For the Cabarrus-South Rowan Urban Area study two supplimentary studies were done-a travel time study and a vehicle occupancy rate study. It is possible that these studies can be used as the basis for a future congestion monitoring system for the urban area.

A. TRAVEL TIME STUDY

From July to August of 1993 teams of data collectors ran travel time studies on several of the major thoroughfares in the planning area. The floating car method, in which the time it takes for a car to travel from one end of the section to the other, was used to survey speeds on the sections at different times of day and at different locations in the area.

Travel times on representative street segments during both peak and off-peak times were found. Basic roadway inventory data such as segment length, functional class, speed limit, number of lanes, peak hour directional traffic volumes, and directional distribution were needed for each segment. Percent green time, location, and coordination of signals were also determined. The date and cost of conducting the survey were also important to know for the analysis.

Eleven sample sections were selected for analysis. The AM peak hour was from 6:30 to 8:30 and the AM off-peak hour was from 9:00 to 11:00. The PM peak hour was from 3:30 to 5:30 and the PM off-peak hour was from 2:00 to 3:00. Figure D-1 shows the numbers and locations of the segments. Figure D-2 is an example of a completed survey form.

Travel time studies should be repeated periodically on these same sections and then the speed and traffic volume data compared. Hopefully this will show changes in congestion in the area.

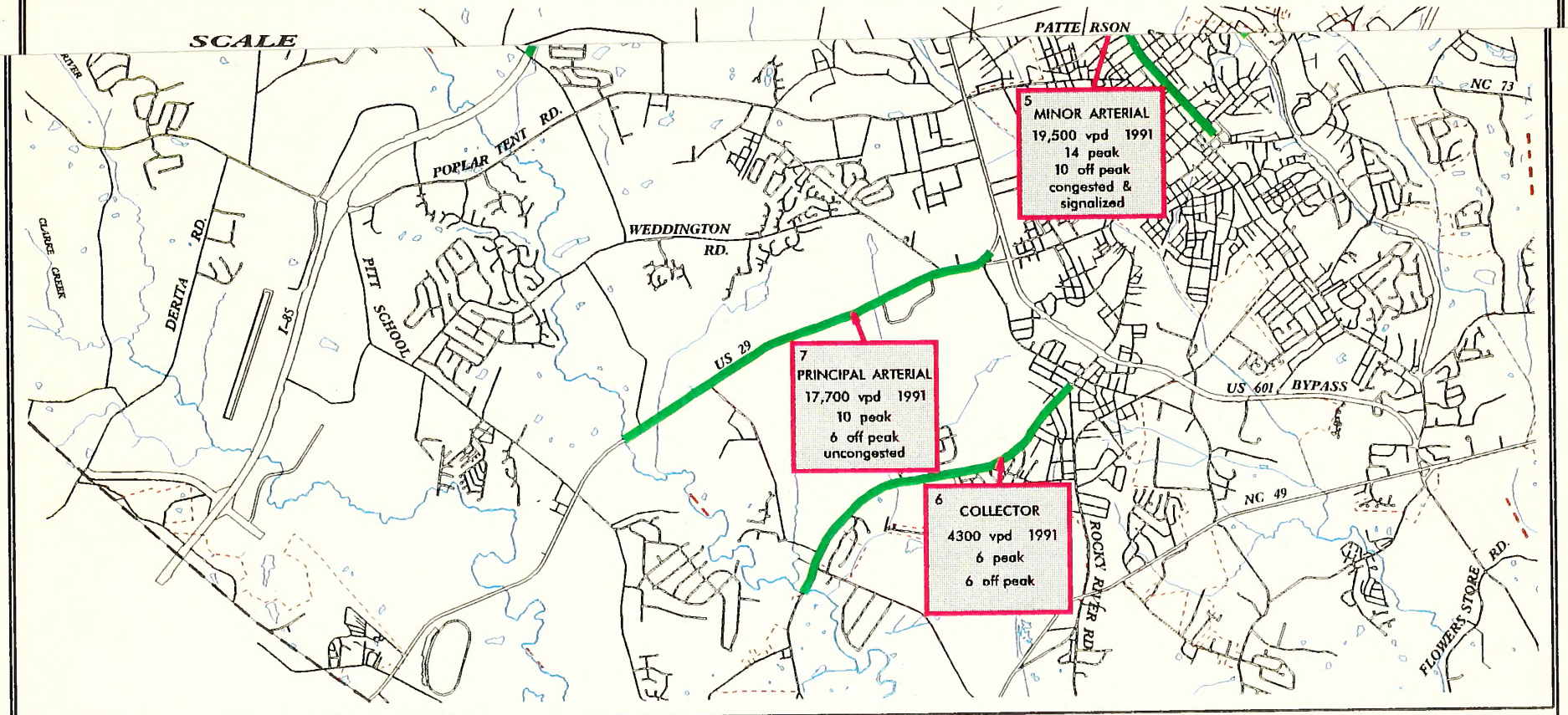
B. VEHICLE OCCUPANCY RATE STUDY

The analysis of the change in vehicle occupancy rates (VOR) over time is one method of measuring the effect of a city's efforts to promote paratransit alternatives. VOR are also a good indicator of the public's reaction to changes in congestion, fuel costs, weather, and the availability of parking.

VOR data was collected in conjunction with the travel time study. Both AM and PM peak and off-peak counts were taken for 40 locations. The proceedure recommended by the North Carolina Public Transit Division was used. The total number of vehicles, total passenger vehicles and total passengers were counted. Figure D-3 shows the type of form used.

The number of passengers per passenger vehicle was calculated for each location. The average VOR for the 40 locations was calculated at 1.43, but the weighted average VOR was 1.35 persons per passenger vehicle(ppv). Each peak and off-peak VOR, and the

total peak and off-peak VOR were calculated. The highest was the total PM peak measurement at 1.66 ppv and the lowest was the total AM peak at 1.17 ppv. Just like a travel time study, VOR rates should be repeated periodically.



KANNAPOLIS – CONCORD

CABARRUS COUNTY
ROWAN COUNTY
NORTH CAROLINA

TRAVEL TIME
STUDY SECTION LOCATIONS

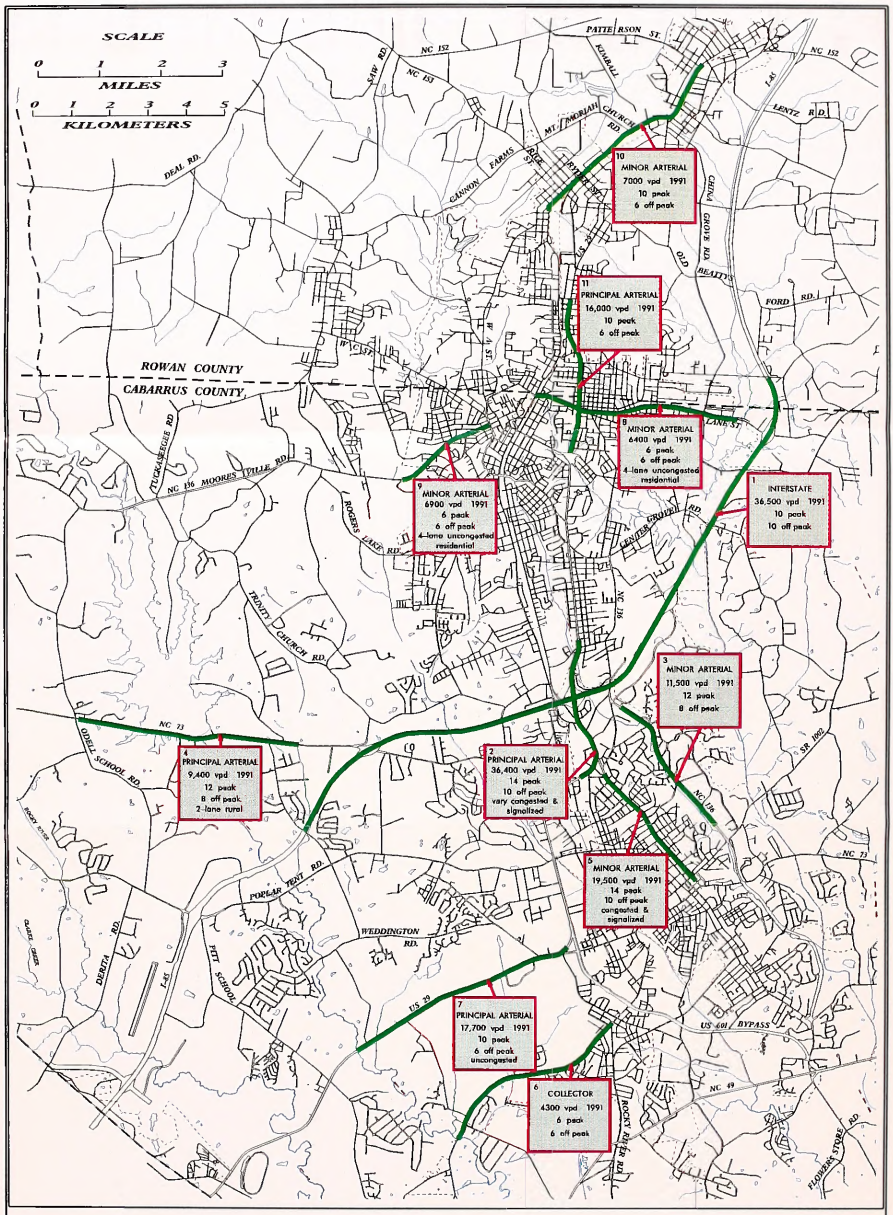
June, 1995

N
S

PREPARED BY
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH – GIS BRANCH
IN COOPERATION WITH THE
U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

FIGURE D-1

total peak and off-peak VOR were calculated. The highest was the total PM peak measurement at 1.66 ppv and the lowest was the total AM peak at 1.17 ppv. Just like a travel time study, VOR rates should be repeated periodically.



TRAVEL TIME STUDY SECTION LOCATIONS

June, 1995

KANNAPOLIS – CONCORD

CABARRUS COUNTY
ROWAN COUNTY
NORTH CAROLINA

PREPARED BY
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH – GIS BRANCH
IN COOPERATION WITH THE
U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

FIGURE D-1

FIGURE D-2

TRAVEL TIME SURVEY

Section Name : _____

Length : _____

Functional Classification : _____

Adt : _____

Roadway Characteristics :

Number of lanes _____

Number of signals _____

Posted speed _____

Number of driveways : ☐ low ☐ med ☐ high

Development density : ☐ low ☐ med ☐ high

Development character : ☐ residential ☐ commercial ☐ industrial ☐ mixed

Run Number	Cardinal Direction	Time of Day	Total Running Time	Total Stop Time	Number of Stops	Average Speed	Average Stoptime Delay

Date: _____

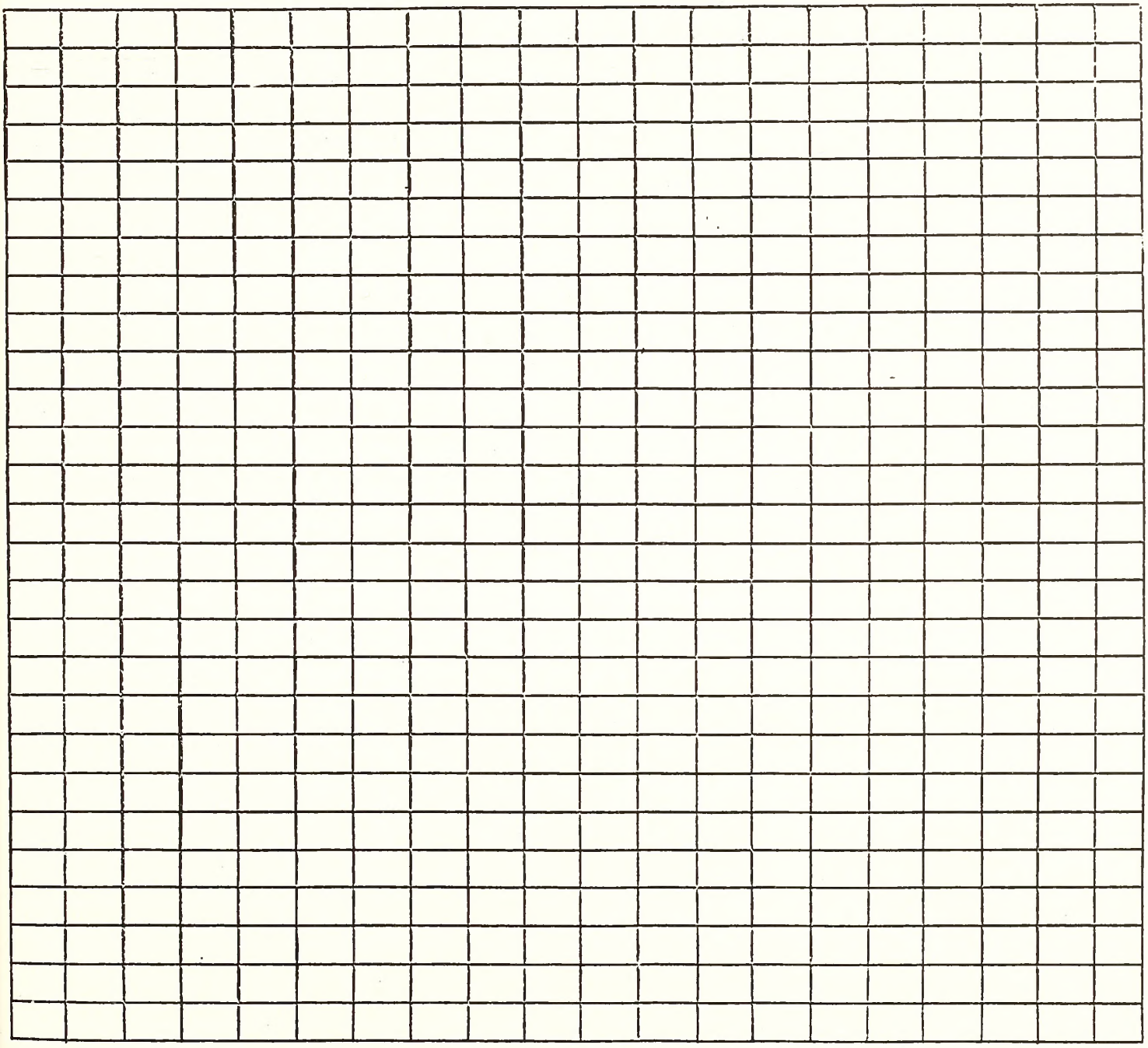
FIGURE D-3

WORKSHEET FOR CONDUCTING VEHICLE OCCUPANCY COUNTS

DATE: _____ TIME: From : a.m. to : a.m. TEAM NUMBER: _____

Instructions: Count during a 15 minute interval. Use one worksheet per traffic lane. Count occupants of cars, vans and pickups. Denote motorcycles - M, Buses - B and Trucks - T. Each block below indicates one vehicle.

After completion of counts please turn in worksheets to or



OFFICE USE ONLY ----------

TOTAL VEHICLES: _____ TOTAL PASSENGER VEHICLES: _____ TOTAL PASSENGERS: _____

ARTERIAL: _____ LOCATION: _____

APPENDIX E. PUBLIC PARTICIPATION PROCESS

A major part of any thoroughfare plan study is the opinion of the citizens directly affected by the plan. In the Kannapolis-Concord Area this information was acquired in two ways--a goals and objectives survey and the presentation of alternative plans at several public meetings throughout the area.

A. GOALS AND OBJECTIVES SURVEY

A goals and objectives survey form (See Figure E-1) was put together to solicit opinions on public spending and financing for transportation, transit, congestion, and other related issues of importance to the area. During the summer of 1994 approximately 1000 survey forms were distributed to the five municipalities and two counties in the area through mass mailings by the Cabarrus County and Kannapolis City Chambers of Commerce. Forms were placed in public libraries, government offices and public utility offices. Input was also solicited from neighborhood associations, fire and social services departments, and civic and social organizations.

There were 109 responses to the survey giving an eleven percent return rate. It is preferred that the rate be higher, but the data collected is still useful and cannot be ignored.

From the data collected it was concluded that the respondents felt that there was an adequate amount of money spent on residential streets and major arterials, but there should be more spent on the network of collector roads in the area. Respondents felt that more money should be spent on bikeways, greenways and buses. A large percentage, 73%, were willing to spend more in taxes designated specifically for transportation, but others felt that present funding should be used more efficiently to meet the area's needs.

In the second area of interest, transit usage, a large percentage of the respondents supported mass transit in some form and were willing to add up to fifteen minutes to their commute to work. Opposition responses included lack of trip flexibility and not wanting increased taxes to pay for service.

The third section of the survey dealt with local financing of transportation. When asked if they would support local bonds for transportation improvements 22% of the respondents did not want any. The rest of the respondents favored spending bond money on specific areas of transportation.

When asked to list three of the most congested locations in the area in section four of the survey the ones mentioned most often were: the triangle area at Cabarrus Avenue and US 29/601, the mall/hospital corridor, and the intersection of Church and Corban Streets in Concord.

Section five contained a broad range of issues and the respondents were asked to rate how important the issues were to them. The item that received by far the highest importance rating

was traffic safety and the reduction in accidents. The item that received the most votes of least important was adding carpool lanes to existing roads. The other thirty-nine items fell somewhere in between.

B. PUBLIC MEETINGS AND OTHER INVOLVEMENT OPPORTUNITIES

In addition to the goals and objectives survey comments were received directly from the public. This took place during the summers of 1994 and 1995. There were:

1. Ten presentations of recommended plan alternatives to local governing boards and the public. See Figures E-2 and E-3. Final adoption dates for the plan were: March 7, 1996 for Rowan County; March 19, 1996 for Cabarrus County; March 5, 1996 for China Grove; March 4, 1996 for Landis; March 25, 1996 for Kannapolis; March 14, 1996 for Concord; March 11, 1996 for Harrisburg; April 24, 1996 for the Transportation Advisory Committee; and June 7, 1996 for the State Board of Transportation.

2. A public television interview on the draft thoroughfare plan and the local transportation improvement program process was given in July of 1994.

3. Discussions of transportation issues with Service organizations, EMS and Social Services, neighborhood groups, real estate agencies, and other community development organizations have been on-going since the spring of 1994 concerning many transportation issues.

4. Three Articles and other official notices in the four major newspapers in the area including: "Clearing Clogged Arteries" on May 18, 1995 about Cabarrus County improvements included in the State Plan; "Gateway to Growth" on May 28, 1995 about the relationship between roadbuilding and business growth: and "Congestion Management" on January 14, 1996 about the area's congestion management plan.

Comments from the public meetings and presentations were compiled into a list of suggestions for analysis and are listed by municipality in Figure E-4.

PLANNING FOR TOMORROW:
GOALS AND OBJECTIVES SURVEY
FUTURE OF TRANSPORTATION

KANLACON URBAN AREA .
FIGURE E-1

Name (Optional) Data Summary
Organization Survey distribution - Summer, 1994
Neighborhood/Community N = 109

****

A. SPENDING:

SHOULD WE SPEND MORE OR LESS TRANSPORTATION DOLLARS FOR THE FOLLOWING?

KEY: 1-Much Less 2-Less 3-Same 4-More 5-Much More 6-No Opinion

same(3) 52% A. Residential Streets
more(4) 36% B. Collector Roads (Cabarrus Ave, Main St, Odell School Rd, Poplar Tent Rd)
same(3) 32% C. Arterials (NC24/27, NC49, I-85)
same(3) 38% D. Sidewalks
more(4) 33% E. Bikeways
same(3) 36% F. Parking Facilities
more(4) 35% G. Greenways/Recreational Trails
more(4) 27% H. Bus Transit
same(3) 25% I. Carpooling
same(3) 32% J. Van Service for Elderly and Handicapped
____ K. Other (List attached)

ARE YOU WILLING TO SPEND MORE IN EARMARKED TAXES FOR ANY OF THESE FUNCTIONS? 73% YES 27% NO

If no, why not? (attached)

B. TRANSIT:

Do you support transit (carpooling, bus service, rail, etc.)? Yes 82% No 18%
If yes: How much additional time are you willing to add to your work trip (one way) in order to use alternate transit modes?

26% Less than 15 minutes	-0- 45 minutes
37% 15 minutes	3% 1 hour
34% 30 minutes	-0- More than 1 hour

If no: Why not? (attached)

(over)

C. *LOCAL FINANCE:*

Would you support a bond issue that would specifically be designated for the following?
What township do you reside in?_____
Answer YES/NO: (22% responded "NO" to any bonds)

Rank Ordered

3 A. Maintenance of existing city/town streets
6 B. Construction of new streets
2 C. Sidewalk construction or improvements
5 D. Improved bus or transit service
1 E. Construction of Greenways/Recreational Trails
4 F. Bikeways
____ G. Other (List attached)

D. *TRAFFIC CONGESTION:*

In your opinion, if Traffic Congestion is a problem, list the three worse streets or intersections in the region:

1. Triangel Area - US29/601/Cabarrus Avenue (65)
2. Mall - Hospital Corridor (44)
3. Church Street - US601 ~~Bypass~~ Business & NC73 (19)

The following items are usually considered in the development of a transportation plan for an urban area. Please indicate how important or desirable each of these items are to your community. Please review all items before evaluation.

HOW IMPORTANT ARE EACH OF THESE ISSUES TO YOU?

ISSUE	1 Not Important	2	3 Neutral	4	5 Very Important
. Planting trees along streets	20	2	36	37	14
. Scenic Hwys	16	12	42	26	11
. Access to Parks and Recreation	7	5	34	42	19
. Preservation of Historic Sites	3	11	21	50	24
. Transportation impacts on environment	3	9	22	43	32

ISSUE	1 Not Important	2	3 Neutral	4	5 Very Important
6. Reduce Air/Noise Pollution	8	10	20	34	37
7. Sedimentation and Stormwater mgmt	6	4	32	44	24
8. Discourage use of Automobile	13	15	57	14	10
9. Hwy Beautification Wildflower Planting	10	10	31	40	18
10. Bicycle Routes/ Lanes, Access	14	17	24	35	20
11. Sidewalks & Greenways	8	13	27	42	19
12. Pedestrian Access	2	9	37	41	20
13. Protecting Natural Areas/Open Spaces	3	9	27	46	24
14. Preserve Land for Future Roads	9	9	34	31	26
15. Protecting Homes/ Industry along Roadways	1	5	35	40	29
16. Develop New Roads to Relieve Congestion	4	9	18	39	40
17. Improve Timing and Coordination of Traffic Signals	2	2	14	35	58
18. Reducing Traffic Accidents	1	2	12	27	67
19. Improving Traffic Safety	∅	2	15	23	70

(over)

ISSUE	1 Not Important	2	3 Neutral	4	5 Very Important
20. Protecting N'hoods From Truck Traffic	5	3	18	39	42
21. Ease of Travel to Downtown, Home, Work	1	2	25	43	35
22. Travel Time	5	6	37	38	21
23. School Travel	7	5	24	30	41
24. Availability of Alternate Modes of Transit (Bus,bikes)	11	10	23	35	27
25. Building Light Rail System (Commuter Trains)	27	16	25	20	18
26. Access to Industrial, Shopping Centers	8	8	38	39	13
27. Restrict Truck Unloading Times and Require Off-Street Unloading Areas	8	11	36	30	23
28. Improve Roads to Attract Industry	4	8	38	31	25
29. Improve Streets Near Schools, Churches and Public Buildings	1	8	39	31	28
30. Improve Traffic Flow at Intersections	Ø	2	15	44	48
31. Improve Conditions at Railroad Crossings	Ø	2	28	32	46
32. Specialized Transit Services for Elderly and Disabled	1	6	35	37	23
33. One-Way Streets	21	15	49	14	5

ISSUE	1 Not Important	2	3 Neutral	4	5 Very Important
34. Remove Street Parking to Improve Road Capacity	10	12	49	26	14
35. Strict Commercial Driveway Entrance Requirements	5	12	39	26	24
36. Construct Roads to Promote Jobs	13	12	42	19	21
37. Connect existing Streets	8	15	44	22	17
38. Adding Carpool lanes to Existing Roads	33	15	42	18	7
39. Increase Capacity of Streets to handle Traffic	6	7	25	43	27
40. Minimize Highway Maintenance Costs	5	6	25	43	29
41. Minimize Highway Construction Costs	3	5	25	35	39
TOTALS:	312	341	1259	1384	1135

Comments:

(Attached)

Thank you for your time *Please Return To:*

Sarah W. LaBelle, Transportation Planner
Cabarrus County
Planning, Zoning, Building Inspection Department
P.O. Box 707
Concord, NC 28026-0707

FIGURE E-2

JUNE CALENDAR
1994

Presentation of Traffic Forecasting on Area Roads:

LANDIS TOWN COUNCIL
June 6, 1994
7:00 pm
Landis Town Hall
136 N. Central Ave.

CHINA GROVE TOWN COUNCIL
June 7, 1994
7:30 pm
China Grove Town Hall
205 Swink St.

CONCORD CITY COUNCIL
June 9, 1994
7:30 pm
Concord City Annex Bldg.
26 Union St., South

ROWAN COUNTY COMMISSIONERS
June 20, 1994
7:00 pm
Agricultural Extension Building
2727 Old Concord Rd.

KANNAPOLIS CITY COUNCIL
June 23, 1994
7:30 pm
Kannapolis Police Department
314 S. Main St.

COMMUNITY MEETINGS FOR BOTH LTIP AND TP-ROADS:

LANDIS: Corriher-Lite Middle School Cafeteria
214 W. Rice St.
LTIP - June 21, 1994 7:00pm - 9:00pm
TP-Roads - June 28, 1994 7:00 - 9:00pm

KANNAPOLIS: YMCA - Room C
101 YMCA Drive
LTIP - June 22, 1994 7:30pm - 9:00pm
TP-Roads - June 30, 1994 7:30pm - 9:00pm

CONCORD: Cabarrus County Senior Center Multipurpose Room
331 Corban Ave.
LTIP - June 23, 1994 7:30pm - 9:00pm
TP Roads - June 29, 1994 7:30pm - 9:00pm

FIGURE E-3

(DRAFT) ***TRANSPORTATION PLAN***

CONCORD-KANNAPOLIS URBAN AREA

PUBLIC WORKSHOP

The public is invited to review and comment on the draft area transportation plan. The current plan is being reevaluated. Your help is needed to include all anticipated road improvements.

TUESDAY 8/22
6:00 - 9:00 PM
CABARRUS COUNTY GOVERNMENT CENTER

THURSDAY 8/24
6:00 - 9:00 PM
KANNAPOLIS CITY COUNCIL CHAMBER

For more information please contact:

Sarah LaBelle, Transportation Planner
788-8141

FIGURE E-4

DRAFT
October 12, 1995

Summary of collective input for the urban area TRANSPORTATION PLAN

CABARRUS COUNTY

NC73: I-85 to Westside Bypass - widen to 4-lanes
US29 to I-77 - widen to 4-lanes

Rankin Road: NC136 to Trinity Church Road - widen, straighten curve, new bridge. Property owner willing to dedicate R-O-W

Derita Road: Upgrade from County line to airport

King's Grant Parkway: Connection to Derita Road in Mecklenburg Co.

NC136 and I-85: Overall coordination with Mecklenburg County for traffic movement in and out of the two counties

Coddle Creek area: What if this becomes a recreation area? Traffic implications?

Concord Regional Airport area: Needs focus on transportation service

I-85: Widen through entire urban area

Eastfield Road: Upgrade to County line

Poplar Tent Road: Upgrade and widen from Metropolitan Area Boundary (MAB) to County line.

Odell School and Derita Roads: Realignment

Odell School Road: Improve to NC136

Windy Road: Upgrade from Odell School Road to NC136

Davidson Road: Upgrade to County line.

FIGURE E-4

ROWAN COUNTY

Tuckaseegee Road
Deal Road
Unity Church Road
Wright Road

These are all roads that will be greatly impacted due to rapid growth in the southwestern area of the County. Each has been regarded as future potential candidates for upgrade and/or widening.

Overall improvement of east-west movement

West C Street: Extend to meet Deal Road

Cannon Farms Road: Extend west to meet Deal Road

KANNAPOLIS

North Extension: From Centergrove Road to Beattie Ford Road

LANDIS

Strong support of the interchange at I-85 and Beatty Ford Road.

Connection of Kimball Road at US29A intersection to US29/601. This to include an underpass.

Connection of Mount Moriah Church Road to Kimball Road, Patterson Street, NC152 and Shue Road

CHINA GROVE

Connect China Grove Road to NC152

Connect NC152 to Lentz Road

Connect Mount Moriah Church to Kimball Road, Patterson Street, NC152 and Shue Road.

Complete loop of Shue Road south of NC152 through Patterson parallel (NE) of Kimball connecting US29A (Main Street)

FIGURE E-4

CONCORD

Pitts School Road terminus: Locate further east on Poplar Tent Road

Synchronize traffic lights - Mall area

Church and Union Streets: One-way street for portion

South Union: Improve from Old Airport Road to NC49

Connection between Wilshire and NC136 Extension

Weddington Road: Improve and extend from King's Grant Parkway to Rock Hill Church Road

Cabarrus Avenue: Widen from NC136 to US601 Bypass

HARRISBURG

Better flow from I-85 to NC49: From King's Grant Parkway exit to US29, to NC49 - improve alignment

King's Grant Parkway: Add an exit lane before reaching US29. Bring this southwest to align with Morehead Road.

Morehead Road: Widen to 3-lanes from Mallard Creek to NC49. Continue south across NC49 to Robinson Church Road with a tunnel under railroad.

East bypass from Morehead Road to Robinson Church Road. Existing proposed should be moved further out along Stallings Road - align with lower Rocky river Road. East bypass needs to be moved further away from town limits.

Strong support of connection of Caldwell to Hudspeth Road

US29 (U-3115): Change median, as planned, to a center lane

APPENDIX F. ENVIRONMENTAL NOTES FROM TABLE 2-1

1. Five dwelling units will have proximity damage. Two minor stream crossings will be needed. This project traverses 5.0 acres of critical watersupply watershed and 2.5 acres of protected watershed.

2. A railroad bridge and a major stream crossing will be needed. Five dwelling units and four businesses will be taken. Two dwelling units will have proximity damages. There is one reported groudwater incident in proximity. Two acres of hydric soils will be impacted.

3. Four dwelling units will be taken and five will have proximity damage. This project will take 0.3.acres of wetlands and six acres of hydric soils.

4. Eight dwelling units will be taken and three dwelling units will have proximity damage. One business and one church will be taken. One railroad bridge will be needed. Right-of-way should be taken on the side opposite the cemetery. One-half acre of hydric soils will be impacted.

5. The existing railroad bridge and culvert must be widened. Forty businesses and thirty dwelling units will be taken. Ten businesses and fifteen dwelling units will have proximity damage. Part of this project is located inside the Concord historic district. Ten acres of hydric soils will be impacted. Barber-Scotia College will have proximity damage.

6. A minor stream crossing will be needed. The project will take 0.10 acres of wetlands and five acres of hydric soils. One dwelling unit and two businesses will be taken.

7. Four new stream crossings will be needed. A lake dam will be breeched. Ten dwelling units and thirteen acres of hydric soils will be taken. Twenty-eight dwelling units and two businesses will have proximity damage.

8. Seventeen dwelling units and the Boy Scouts Outdoor Camp will have proximity impacts. Two new stream crossings will be needed and two acres of hydric soils will be impacted. Twelve dwelling units and seven businesses will be taken.

9. The bridge over Rocky River must be widened, 0.60 acres of wetlands and three acres of hydric soils taken. One business and thirteen dwelling units will have proximity damages. The entrance to the Concord Regional Airport will also be affected. There is one National Historic Register site in proximity.

10. One dwelling unit will have proximity damage.

11. Two dwelling units will be taken and one dwelling unit will have proximity damage. One new stream crossing will be needed and 2.5 acres of hydric soils taken.

12. Ten dwelling units will have proximity impacts. One dwelling unit and three businesses will be taken. Two new stream crossings and a bridge across the quarry will be needed. The project traverses 8.7 acres of protected watersupply watershed area.

13. The major bridge crossing over the Rocky River must be widened and 21 acres of hydric soils taken. A minor stream crossing must be widened. Four dwelling units and two businesses will be taken. Six dwelling units and two businesses will have proximity impacts.

14. One-and-a-half acres of wooded land taken.

15. Four stream crossings will have to be widened. Ten grade separations must be widened. Two railroad grade separations must be widened. Seven interchanges must be expanded. One new interchange must be constructed. Most of this project passes south of the watersupply watershed area.

16. One new stream crossing and 5.7 acres protected watershed area. One new railroad bridge is needed. Two dwelling units and four businesses taken. Three dwelling units and one business with proximity damages.

17. There are two dwelling units and one business with proximity impacts. There will be 12 acres of wetlands influenced, 18 acres of hydric soils and 5.6 acres of protected watershed.

18. There will be two businesses taken and twelve dwelling units and five businesses with proximity impacts. It would be best to take right-of-way across the road from the church and cemetery. One groundwater incident site is influenced.

19. There will be six businesses taken and one new creek crossing. One groundwater incident site is impacted.

20. The railroad crossing will have to be widened. Twenty-two dwelling units and fourteen businesses will be taken. Fifteen dwelling units and ten businesses will have proximity impacts. One school will have proximity impacts. One groundwater incident site is impacted.

21. The bridge over the Rocky River must be widened. It would be best to take right-of-way on the side opposite the cemetery and the fire station. Nine businesses and twenty-five dwelling units will have proximity impacts.

22. Six dwelling units will have proximity damage. Two dwelling units and two businesses will be taken. One new stream crossing will be needed and a lake dam will have proximity impacts. One NPDES site, two acres of wetlands, and one surface water intake will be impacted.

23. Twenty-one businesses and fourteen dwelling units will be taken. Seven businesses and nine dwelling units will have proximity impacts. The bridges over Coddle Creek and Rocky River must be widened. The dam and another bridge over the Coddle Creek Reservoir must be widened. Two groundwater incident sites and two NPDES sites are impacted. Three Natural Heritage element sites are influenced. One six acre lake, 0.5 acres wetlands, 15.3 acres of high quality water zone area and 23 acres of hydric soils are impacted.

24. Two businesses and eleven dwelling units will be taken. Three businesses and five dwelling units will have proximity impacts. One bridge must be widened and one acre of hydric soils impacted.

25. Twelve dwelling units and five businesses will have proximity damage. A cemetery will have proximity damage. A bridge and a culvert will have to be widened. A surface water intake, 52 acres of high quality water zone and six acres of hydric soils will be impacted.

26. Most of the right-of-way should be acquired on the east side of the existing facility away from the majority of the development. North of I-85 there will be twelve dwelling units and four businesses taken and twenty dwelling units with proximity damage. South of I-85 a bridge will have to be widened. Six businesses will be taken. Thirteen businesses and two dwelling units will have proximity damage. Eight acres of hydric soils will be impacted.

27. Four dwelling units and one business will be taken. A new stream crossing will be neeeded.

28. Two businesses will have proximity damage. The railroad bridge will have to be widened and nine acres of protected watershed impacted.

29. One dwelling unit and 16 acres of hydric soils will be taken.

30. Two dwelling units will be taken. Thirty-one dwelling

units will have proximity damage. Odell School will have proximity damage and 0.6 acres of high quality water zone impacted.

31. Fifteen dwelling units and three businesses will be taken. Eleven dwelling units will have proximity damages. Two acres of hydric soils will be impacted.

32. Seventeen dwelling units and nine businesses will be taken. Twenty-five dwelling units will have proximity damage. The National Guard Station and the Fire Station will have proximity impacts. The Stonewall Jackson Training Camp will have proximity impacts and the arch over the road taken. Fries Middle School will have proximity damage. Two Natural Heritage element sites will be impacted.

33. Two churches and a fire station would have proximity impacts. Two businesses and five dwelling units would be taken. Four businesses and thirty-eight dwelling units would have proximity impacts. Two acres of hydric soils will be impacted.

34. One dwelling unit would be taken. Eight dwelling units and two businesses would have proximity impacts. The bridge over the Rocky River would have to be widened and three acres of hydric soils would be taken. One NPDES site will be impacted.

35. Twenty dwelling units and three businesses would be taken. Twenty-eight dwelling units and two businesses would have proximity impacts including the Concord Municipal Airport runway and a tire recycling plant. Two churches and a local ballfield would also have proximity impacts. One NPDES site, one solid waste facility and three acres of hydric soils are imacted.

36. Five businesses and 43 dwelling units will be taken. Four usinesses and fifty-five dwelling units will have proximity impacts. Two bridges and a culvert will have to be widened. There will be 0.2 acres of wetland and 17 acres of hydric soils impacted.

37. Nine dwelling units and seven businesses will be taken. Twenty businesses and 46 dwelling units will have proximity impacts. A new railroad bridge will be needed. A bridge and a culvert will have to be widened. One Natural Heritage element site will be impacted.

38. Two dwelling units will be taken. One business will have proximity impacts. One new minor stream crossing will be needed and 0.2 acres wetlands and four acres of hydric soils will be impacted.

39. Two dwelling units and two businesses will be taken. Ten dwelling units and five businesses will have proximity impacts. One new minor stream crossing will be needed. Three acres of hydric soils and 0.2 acres wetlands will be impacted.

40. Two dwelling units and one business will be taken. Three dwelling units and one business will have proximity impacts. One existing stream crossing must be widened and 15 acres of hydric soils will be impacted.

41. Three dwelling units and three businesses will be taken. One dwelling unit, the Rowan-Cabarrus Community College and Northwest Cabarrus High and Middle Schools campuses will have proximity damages. One acre of hydric soils will be impacted.

42. Four dwelling units and three businesses will be taken. Ten dwelling units will have proximity damage.

43. The four bridges over Irish Buffalo Creek and the railroad tracks and a culvert must all be widened. Two acres of hydric soils will be impacted. Forty businesses including the regional Shopping Mall and Hospital will have proximity damages.

44. Ten dwelling units and fourteen businesses, including Philip Morris, will have proximity damage. The bridges over Coddle Creek and Rocky River must be widened.

45. One dwelling unit and five businesses will be taken. Four dwelling units and eight businesses, including two Cabarrus County human services buildings, will have proximity impacts. Two bridges must be widened and six acres of hydric soils will be impacted.

46. Five dwelling units and four businesses will be taken. An elementary school will have proximity damage.

47. Two dwelling units and one business will be taken. Six dwelling units and a fire station will have proximity damage. A culvert and a bridge over Cold Water Creek must be widened and four acres of hydric soils will be impacted.

48. A new bridge over the Rocky River will be needed. Two businesses will have proximity damage.

49. Three dwelling units and one business will be taken. Six dwelling units will have proximity damage. The bridge over Coddle Creek must be widened, one Natural Heritage element site and 18 acres of hydric soils will be impacted.

50. Four dwelling units and one business will be taken. Two businesses will have proximity damage.

51. One dwelling unit and one business will be taken. One business will have proximity damage and 3.6 acres of high quality and protected water zone impacted.

52. Twenty-four dwelling units and five businesses will be taken. Thirty dwelling units and six businesses will have proximity impacts. One bridge must be widened and 0.5 acres of wetlands will be impacted. Three acres of critical watershed, three groundwater incident sites and 0.32 acres high quality water zone are impacted.

53. Twelve dwelling units and four businesses will be taken. Twenty-four dwelling units will have proximity impacts. Three new stream crossings will be needed, 37 acres protected watershed and 73 acres high quality water zone will be impacted.

54. Four dwelling units and five businesses will be taken. Fourty dwelling units and sixteen businesses will have proximity impacts. Six acres of hydric soils will be impacted.

55. Three dwelling units will be taken. One dwelling unit and an elementary school will have proximity impacts. There will be one new major stream crossing and one acre of hydric soils impacted.

56. Three dwelling units will be taken. One new minor stream crossing will be needed and 7.4 acres high quality water zone impacted.

57. Twenty-eight dwelling units will be taken. Thirteen dwelling units and three businesses will have proximity damage. One culvert must be widened. One acre of hydric soils will be impacted. One superfund site will be impacted.

APPENDIX G. MAJOR INVESTMENT STUDY FOR INTERSTATE 85

A. DEFINITION OF A MAJOR INVESTMENT STUDY

As part of development of the long-range transportation plan, it is necessary to fulfill the requirements of the Intermodal Surface Transportation Efficiency Act (ISTEA), the Clean Air Act Amendments (CAAA), and the National Environmental Policy Act (NEPA). A Major Investment Study (MIS) is a planning tool that fuses the principles of ISTEA and NEPA. Under the metropolitan planning regulations (23CFR 450 Subpart C) the MIS focuses on corridor or subarea transportation demand and other problems that may lead to a high type transit or highway investment with a substantial capital investment or impact on the metropolitan transportation system.

The purpose of the MIS is to develop information about the likely impacts and consequences of alternate transportation investment strategies at the corridor or subarea level. The study should include all reasonable alternatives for addressing the identified transportation purpose and need. Only those alternatives that have a reasonable likelihood of being an effective solution or component should be carried forward in the study. An MIS is a cooperative effort between the Cabarrus-South Rowan Metropolitan Planning Organization (MPO), the North Carolina Department of Transportation's Divisions of Highways and Public Transportation, the Federal Highway Administration, any local transit operators and the public.

B. PURPOSE AND NEED

Interstate 85 is of primary importance because it runs through North Carolina connecting seven of its urbanized areas including the Cabarrus-South Rowan Urban Area. Traffic on this facility makes both intrastate trips and local trips inside the urban areas. Present truck percentages, historic traffic growth rates, future traffic projections, and scheduled and recommended construction projects in the planning area all point to high levels of congestion for I-85 in the future.

The traffic volumes along I-85 near the planning area increased 5.5% per year to 53,000 vehicles per day (VPD) from 1990 to 1995. The data from the 1996 long-range transportation planning study model showed that I-85 will experience congestion by the design year 2020 and carry approximately 97,200 VPD. It is anticipated that approximately 70-80% of that traffic will be through traffic or traffic with neither end of the trip stopping inside the urban area. According to the 1994 NCDOT Highway Traffic Statistics Report, I-85 in Salisbury, just north of the study area, presently carries 20% trucks.

The identified need for this project was derived from the above information. The present volume of traffic on this stretch of I-85 is approaching the highway's effective capacity. It will

be nearly double that volume by the design year. The high through trip rate gives rise to transit concerns. Finally, I-85 has one of the highest truck rates in the country. Each of the alternates considered in this document will be examined according to how well it will resolve these problems.

C. LONG-RANGE TRANSPORTATION PLAN

The MIS for I-85 was conducted as part of the Transportation Plan update. The long-range plan update included extensive public involvement, accident history and safety investigation, air quality analysis, freight movement, etc. The public involvement included a Goals and Objectives Survey, many public meetings, and presentations to local policy boards. A more detailed description of the public involvement can be found in Appendix E of the 1996 Cabarrus-South Rowan Thoroughfare Plan Report.

D. ALTERNATE STRATEGIES CONSIDERED

Each of these six strategies were examined, either in the planning study or in this document, to see if they met the purpose and need of the project.

1. Do Nothing--This approach would prevent destruction of the surrounding environment due to construction of any new facilities and the outlay of funds for vans or buses. The traffic volumes on I-85 near the planning area, though, have been growing at a rate of 5.5% per year. If no improvements, other than what was already scheduled in the 1995 State Transportation Improvement Program, are made traffic volumes on I-85 could reach as high as 107,400 VPD by the year 2020.

2. Transportation Demand Management--In the past there have been few attempts in this area at Transportation Demand Management oriented toward reducing the number of trips or number of vehicles on the roadways by encouraging other types of transportation service. There is no existing general public transportation system in the Kannapolis-Concord urban area, therefore, major transit alternatives within the area were not considered as a reasonable strategy to the present transportation problems of I-85. A travel market analysis for the whole I-85 corridor indicated that initiating alternate modes of transportation would not be a viable option due to the high level of through travel, but that the Cabarrus-South Rowan MPO should consider carpool/vanpool commuter programs in the transit study scheduled to begin in FY 1997. Although there are several paratransit programs centered in the City of Charlotte and Mecklenburg County as of late 1996 only a few vanpools were making regular trips as far away as the Cabarrus-South Rowan urban area. Cabarrus County does have a local van service for the elderly and handicaped and others without access to transportation, but that does not reduce the number of vehicles on I-85. The major employers in the planning area like Philip-Morris and Fieldcrest Cannon Mills already have their employees on shift time.

3. High Occupancy Vehicle Lanes--An investigation into the viability of HOV lanes for I-85 through the planning area shows that an insufficient number of vehicles will be removed from the traffic stream to warrant separate travel lanes. For example:

> If the above-mentioned 97,200 future vehicles per day and a 10 percent peak hour percentage factor were used there would be a possible 9,720 vehicles on the highway during each peak hour. The majority of the HOV users would be on the highway during the peak hour. In Appendix D of the 1996 Cabarrus-South Rowan Transportation Plan Report the average AM Peak Hour VOR for the area is 1.17 and the average PM Peak VOR is 1.66 persons per vehicle. This would make 11372 persons during the AM Peak and 16135 persons during the PM Peak hour. Adding these gives 27507 persons making trips during the peak hours of the day. An October 1987 HOV lane study by the Metropolitan Transit Authority of Harris County, Texas stated that two successful HOV programs, the Shirley Highway Expressway in Washington D.C. and the El Monte Busway in Los Angeles, move at least 30 percent of the total person-trip movement on the freeway from the mainline freeway lanes to the HOV lane. Therefore, there would be a possible 3412 and 4841 persons, respectively, transfered to the HOV lanes during the peak hours in this analysis. To determine the number of vehicles removed, each peak hour should be divided by the respective VOR. These two numbers can be added together to give the total number of vehicles, 5833, moved from the total ADT into the HOV lanes. If that number were subtracted from the ADT there would still be 91,367 vehicles in the original four freeway travel lanes.

This remaining volume is still over the 60,000 VPD maximum capacity for a four-lane freeway. The volume in the HOV lane is less than the minimum per-lane capacity set forth in the 1994 Highway Capacity Manual.

4. New Facilities--The Cabarrus-South Rowan Area is developing rapidly. Both residential and commercial development are consuming available land. There is floodplain both east and west of the present I-85 location and the surrounding urban area. The Westside Bypass, projects R-2246 and U-2009, and its extension northward already appear on the adopted transportation plan.

5. Supplementary facilities--There are several smaller projects currently in the North Carolina Transportation Improvement Program and on the 1996 mutually adopted Cabarrus-South Rowan Transportation Plan. Project I-2511 widens I-85 to an eight-lane cross section from Exit 68 to Exit 81 through Rowan County north of the Cabarrus-South Rowan Area with construction to begin in FY1997. The project I-301 widened I-85 to eight lanes

through Charlotte as far north as the NC 49 Connector with construction completed in FY1996. Project R-2315 is a new facility just north of the Mecklenburg County line called Kings Grant/Speedway Boulevard with a new interchange on I-85 to be completed in FY1997. Projects R-2246 and U-2009, the Westside Bypass, have an interchange on I-85 with construction to begin in FY2002. Also on the transportation plan, an interchange is proposed between I-85 and Old Beattys Ford Road. There are potentially nine interchanges in the eighteen mile (30 kilometer) stretch of I-85 through the area. I-85 through the Cabarrus-South Rowan Area is currently only a four-lane freeway cross section. Even with these existing and proposed projects, though, the congestion problems on I-85 will not be completely solved.

6. Widening--The data from the 1996 long-range transportation planning study model showed that I-85 will experience congestion by the design year 2020 and carry approximately 97,200 VPD. This is much higher than the 60,000 VPD capacity recommended for the design of a four-lane freeway facility from the 1994 Highway Capacity Manual. It is also higher than the suggested 80,000 VPD for a six-lane freeway facility.

E. ENVIRONMENTAL CONSIDERATIONS

To minimize any environmental effects of this project on the surrounding land it is suggested that any work on I-85 take place within the existing 300 feet (91.5 m) of right-of-way. The precise environmental effects of the project will be evaluated during the planning stage once the project is programed in the local and State Transportation Improvement Programs (TIP).

F. CONCLUSIONS

After considering all the above alternatives it was determined that widening the facility to eight lanes would be the best course of action because:

1. If nothing is done, the anticipated traffic will overburden the existing facility and increase congestion and reduce safety on the facility.

2. The majority of the present travel on this facility is through traffic. A high percentage is also truck traffic. Neither of these travel types are conducive to travel management within the planning area. There is no existing bus system, no previous need for one and judging from the goals and objectives survey there is little interest for one at this time.

3. From the cursory analysis for high occupancy lanes there would not be enough vehicles or riders transferred out of the main traffic stream to warrant the addition of extra lanes.

4. As part of the alternatives analysis of the long-range study it was determined that no new highway-type facilities can be accommodated along the existing I-85 corridor through the urbanized area. There would be extensive environmental and socio-economic damage to the area if a major new facility with a wide right-of-way is introduced.

5. The existing interstate projects on either end of the subject section will cause a bottle-neck effect through the area decreasing travel safety and increasing congestion. The new interchanges will increase the number of weaving sections through the area also reducing safety along the four-lane section. The other projects will not significantly decrease the volume of traffic on the interstate through the area.

6. The approximate 97,200 VPD is higher than both the four-lane and six-lane recommended capacities in the Highway Capacity Manual.

This document will serve as the Major Investment Study (MIS) for I-85 through the Cabarrus-South Rowan Area and identifies the reasonable alternatives and strategies studied for the I-85 corridor and reports on the alternative selected for the corridor. The selected alternative will be carried forward into the project development stage where a NEPA document will be prepared.

G. COORDINATION

This document may be incorporated into the planning document for this project by the Planning and Environmental Branch of NCDOT. This MIS has been a cooperative effort between the Cabarrus-South Rowan Metropolitan Planning Organization (MPO), the North Carolina Department of Transportation's Divisions of Highways and Public Transportation and the Federal Highway Administration. The correspondence from the Cabarrus-South Rowan MPO and the NCDOT Public Transportation Division (Figure G-1) are included.

The long-range plan update included extensive public involvement. This included a Goals and Objectives Survey, many public meetings, and presentations to local policy boards. The only relevant suggested improvement was the widening of I-85. A more detailed description can be found in Appendix E of the 1996 Cabarrus-South Rowan Thoroughfare Plan Report.

What follows is an exerpt from the minutes of the January 15, 1997 meeting of the Cabarrus-South Rowan Metropolitan Planning Organization Transportation Advisory Committee at which the Major Investment Study for I-85 was approved:

> Dosse briefly defined the MIS and that one is conducted on all high-cost projects that are identified in the Thoroughfare Plan. She explained that the only project in the Cabarrus-South Rowan Urban Area is the improvement and widening of I-85. Her presentation was summarized in a handout that provided the definition, purpose and need, how it relates to the long-range transportation plan, and environmental considerations. Additionally, her materials included a discussion about alternative strategies for improvement that were considered as well as the final recommendations. In short, it was determined that widening the current facility from four to eight lanes, through the urban area, was the best course of action. this document will be included in the area transportation plan update technical report due this summer. Dosse explained that she is asking the TAC for formal approval of the MIS and its findings.
>
> Geathers asked for clarification about what exactly, does the MIS satisfy? For example, compliance with CAAA, the Thoroughfare Plan, etc. Dosse responded that this study was a recent requirement and part of the Thoroughfare Plan. Discussion continued about the justification for the recommended widening of I-85 from four to eight lanes rather than to six. The primary reasons are that this would be consistent with the improvements to I-85 in Mecklenburg and Rowan Counties. Additionally, traffic volume forecasts justify the eight-lane expansion.
>
> Geathers asked for a motion to approve the MIS and its findings. Sloop moved with a second by Brown. The motion passed unanimously. Brown and Geathers asked for more information. Geathers was curious whether the I-85 project would proceed regardless of local support. Brown asked when we were going to get the funds to begin. Dosse said that this was up to the action of the BOT. Sloop discussed some of the plans for improvements to I-85 in Rowan County. Dosse further explained that the MIS will be reviewed by the Planning and Environmental Department but this first effort, hopefully, will save time in the required Environmental Review process all projects must pass through prior to design and construction. Rankin asked for clarification of the funding obligation for the Interstate project. Dosse agreed to confirm this information when she returned to Raleigh.

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

JAMES B. HUNT JR.
GOVERNOR

PUBLIC TRANSPORTATION DIVISION
P.O. BOX 25201, RALEIGH, N.C. 27611-5201

GARLAND B. GARRETT JR.
SECRETARY

October 14, 1996

MEMORANDUM

To: Ron Poole, Ph.D., P.E., Manager, Statewide Planning Branch

From: Sanford Cross, Director, Public Transportation Division

Subject: Major Investment Study for I-85 Widening Project in the Kannapolis-Concord Urban Area

The Public Transportation Division has reviewed the above referenced study and has the following comments:

1) We recognize that this study is being conducted in the early stages of planning for facility improvements (in conjunction with the Thoroughfare Plan Update), therefore it is difficult to make final decisions on modal opportunities in the corridor. We will monitor the progress of the proposed project, and once it is scheduled in the North Carolina Transportation Improvement Program for a final environmental planning document, re-evaluate the need for alternative improvements.

2) We concur that the Kannapolis-Concord area needs to look at Transportation Demand Management measures on a regional basis, as well as in an effort to relieve congestion on the I-85 corridor. We also concur that, given the projected traffic volumes, TDM programs alone will not remove the need for improvements to the corridor.

3) We would like to address the High Occupancy Vehicle issue again once the final environmental documentation is programmed. The methodology presented in this major investment study is somewhat simplistic in its effort to determine the future effectiveness of HOV on the I-85 corridor. The Division recognizes that we need to work with the Statewide Planning Branch in determining an appropriate methodology in evaluating the effectiveness of HOV facilities. The Urban Section will undertake this activity so that we can have an agreement on a better methodology for future studies.

Given these findings, the Public Transportation Division believes that the subject study has sufficiently investigated alternative transportation modes for the future I-85 widening

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project as proposed in the Kannapolis-Concord Urban Area Thoroughare Plan. We w ıl retain the opportunity to re-evaluate the High Occupancy Vehicle (HOV) alternative o ıce the final environmental planning document is prepared for the project. There is the potential for changes in travel behavior, traffic projections, and project restrictions tha may require such an effort at that time.

Thank you for the opportunity to work with your staff and to comment on this study. We look forward to working on all of the major investment studies listed in your program of work in the future.

If you have any questions, please contact Carol Carter, Urban Section Manager, at 73: - 4713, extension 226.

CC: Linda Dosse, SWP
Sarah LaBelle, Kanlacon

APPENDIX H. RECOMMENDED STREET DESIGN AND TABULATION INDEX

A. TYPICAL CROSS SECTIONS

Cross section requirements for thoroughfares vary according to the desired capacity and level of service to be provided. Universal standards in the design of thoroughfares are not practical. Each street section must be individually analyzed and its cross section requirements determined on the basis of amount and type of projected traffic, existing capacity, desired level of service, and available right-of-way.

Typical cross section recommendations are shown in Figure H-1. These cross sections are typical for facilities on new location and where right-of-way constraints are not critical. For widening projects and urban projects with limited right-of-way, special cross sections should be developed that meet the needs of the project. On all existing and proposed major thoroughfares delineated on the thoroughfare plan, adequate right-of-way should be protected or acquired for the ultimate cross sections.

Ultimate desirable cross sections for each thoroughfares are listed in this Appendix. Recommendations for "ultimate" cross sections are provided for (1) thoroughfares which may require widening after the current planning period; (2) for thoroughfares which are borderline adequate and accelerated traffic growth could render them deficient; and (3) for thoroughfares where an urban curb and gutter cross section may be locally desirable because of urban development or redevelopment.

Recommended design standards relating to maximum and minimum grades, minimum sight distances, maximum degree of curve and related super elevation, and other considerations for thoroughfares are given in Appendix C. This Appendix gives definitions and design standards recommended for inclusion in subdivision regulations.

Cross sections "A" and "L" are typical for controlled access freeways. The 14 m (46 ft) grassed median is the minimum desirable median width, but there could be some variation from this depending upon design considerations. Right-of-way requirements would typically vary upward from 70 m (228 ft) depending upon cut and fill requirements.

Cross section "B", seven lane curb and gutter, should not be used for new projects. When the conditions warrant six lanes, cross section "D" should be recommended. Cross section "B" should be used only in special situations such as when widening from a five lane section and right-of-way is limited. Even in these situations, consideration should be given to converting the center turn lane to a median so that cross section "D" is the final cross section.

Cross section "C", five lane curb and gutter, is typical for major thoroughfares where frequent left turns are anticipated as a result of abutting development or frequent street intersections.

Cross sections "D", "E", and "M" are used on major thoroughfares where left turns and intersecting streets are not as frequent. Left turns would be restricted to a few selected intersections. The 4.9 m (16 ft) median is the minimum recommended for an urban boulevard type cross section. In most instances, monolithic construction should be utilized due to greater cost effectiveness, ease and speed of placement, and reduced future maintenance requirements. In special cases, grassed or landscaped medians may be used in urban areas. However, these types of medians result in greatly increased maintenance costs and an increased danger to maintenance personnel. Non-monolithic medians should only be recommended when the above concerns are addressed.

Cross section "F" is recommended for urban boulevards or parkways to enhance the urban environment and to improve the compatibility of major thoroughfares with residential areas. A minimum median width of 7.3 m (24 ft) is recommended with 9.1 m (30 ft) being desirable.

Typical cross section "G" is recommended for major thoroughfares where projected travel indicates a need for four travel lanes but traffic is not excessively high, left turning movements are light, and right-of-way is restricted. An additional left turn lane would probably be required at major intersections. This cross section should be used only if the above criteria is met. If right-of-way is not restricted, future strip development could take place and the inner lanes could become de facto left turn lanes.

In urban environments, thoroughfares which are proposed to function as one-way traffic carriers would typically require **cross section "H". Cross sections "I" and "J"** are usually recommended for urban minor thoroughfares since these facilities usually serve both land service and traffic service functions. **Cross section "I"** would be used on those minor thoroughfares where parking on both sides is needed as a result of more intense development.

Cross section "K" is used in rural areas or for staged construction of a wider multi-lane cross section.
On some thoroughfares, projected traffic volumes may indicate that two travel lanes will adequately serve travel for a considerable period of time. For areas that are growing and future widening will be necessary, the full right-of-way of 30 m (100 ft) should be required. In some instances, local ordinances may not allow the full 30 m (100 ft). In those cases, 21 m (70 ft) should be preserved with the understanding that the full 30 m (100 ft) will be preserved by use of building setbacks and future street line ordinances.

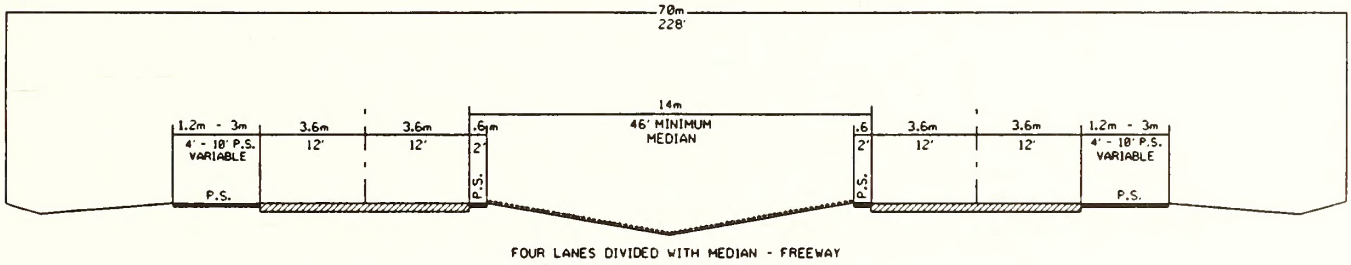
The urban curb and gutter cross sections all illustrate the sidewalk adjacent to the curb with a buffer or utility strip between the sidewalk and the minimum right-of-way line.

*_**The North Carolina Bicycle Facility and Program Handbook** , Barton-Aschman Associates, Inc., April, 1975.

FIGURE H–1

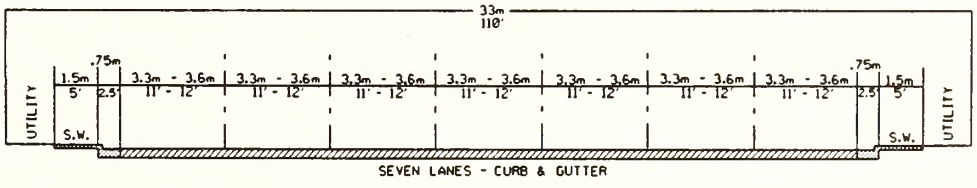
TYPICAL THOROUGHFARE CROSS SECTIONS

A.



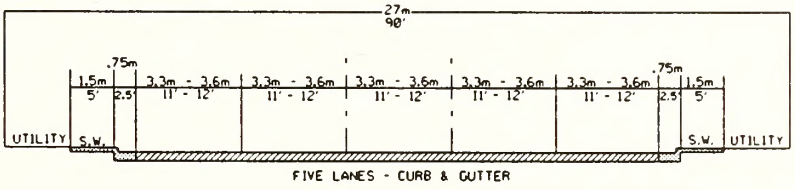
FOUR LANES DIVIDED WITH MEDIAN - FREEWAY

B.



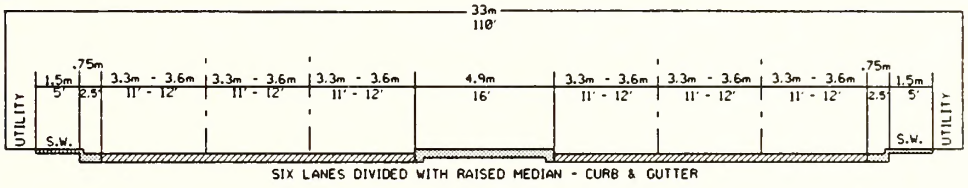
SEVEN LANES - CURB & GUTTER

C.



FIVE LANES - CURB & GUTTER

D.

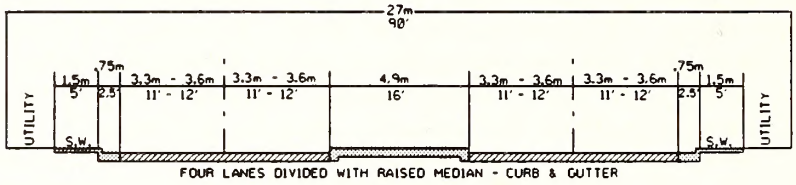


SIX LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

FIGURE H-1

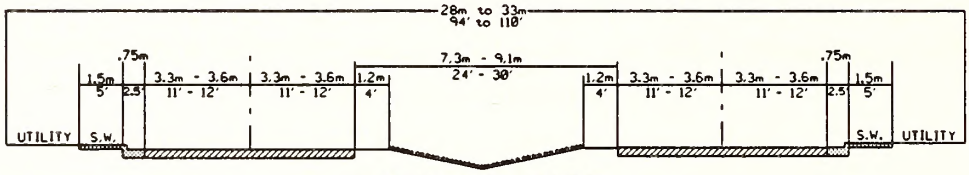
TYPICAL THOROUGHFARE CROSS SECTIONS

E.



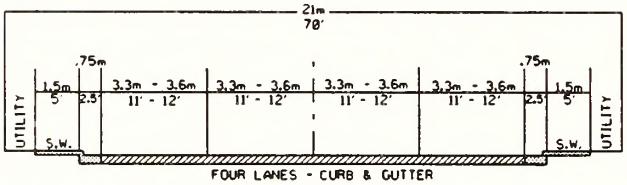
FOUR LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

F.



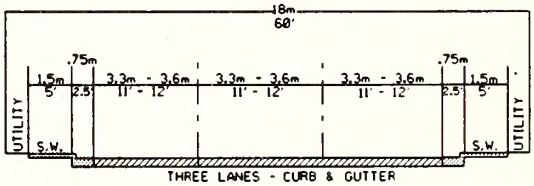
FOUR LANES DIVIDED - BOULEVARD
GRASS MEDIAN

G.



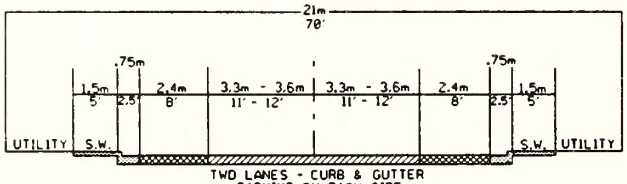
FOUR LANES - CURB & GUTTER

H.



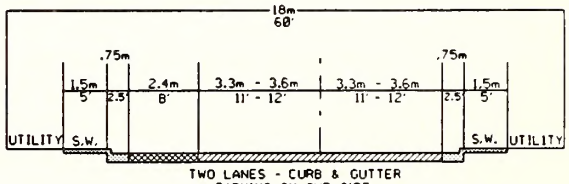
THREE LANES - CURB & GUTTER

I.



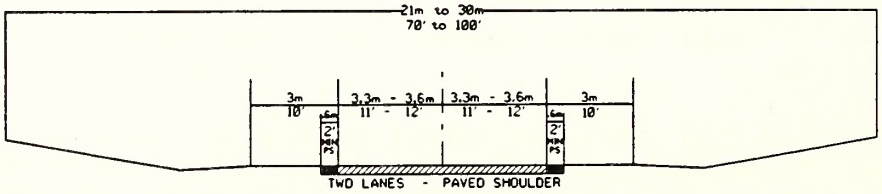
TWO LANES - CURB & GUTTER
PARKING ON EACH SIDE

J.



TWO LANES - CURB & GUTTER
PARKING ON ONE SIDE

K.

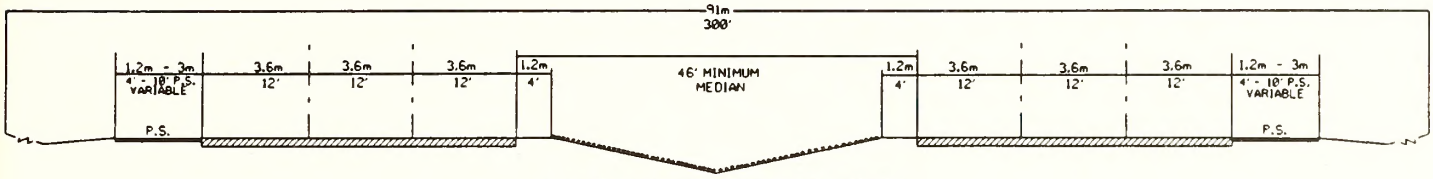


TWO LANES - PAVED SHOULDER

FIGURE H–1

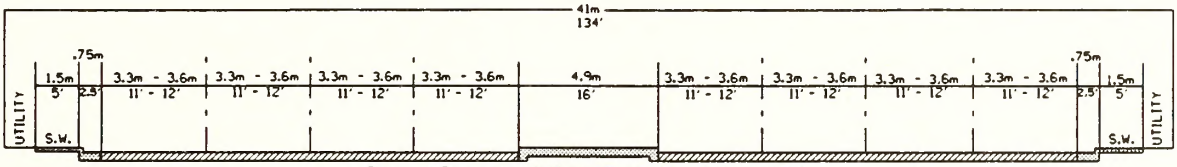
TYPICAL THOROUGHFARE CROSS SECTIONS

L.



SIX LANES DIVIDED WITH GRASS MEDIAN - FREEWAY

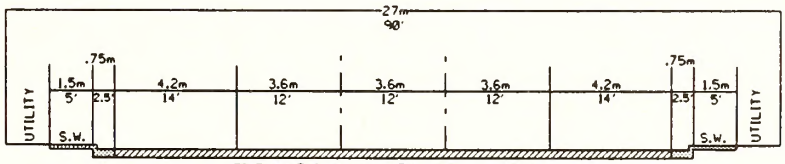
M.



EIGHT LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

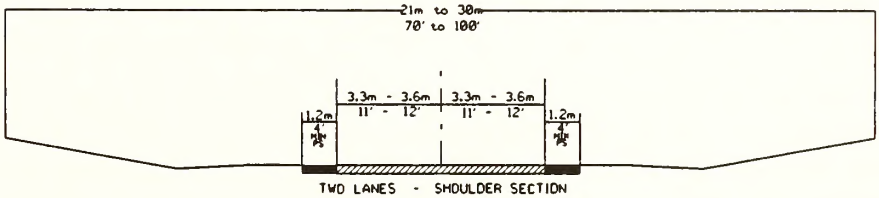
TYPICAL THOROUGHFARE CROSS SECTIONS FOR ACCOMMODATING BICYCLES

N.



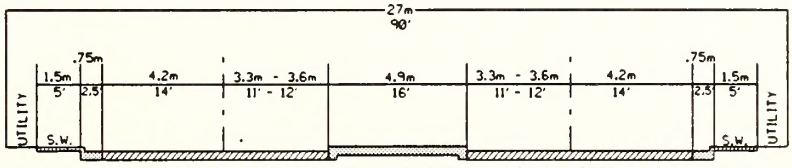
FIVE-LANE ROADWAY WITH CURB & GUTTER.
STANDARD INSIDE LANES & WIDENED CURB LANES

O.



TWO LANES - SHOULDER SECTION

P.



FOUR LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER,
STANDARD INSIDE LANES & WIDENED CURB LANES

This permits adequate setback for utility poles. If it is desired to move the sidewalk farther away from the street to provide additional separation for pedestrians or for aesthetic reasons, additional right-of-way must be provided to insure adequate setback for utility poles.

The right-of-ways shown for the typical cross sections are the minimum rights-of-way required to contain the street, sidewalks, utilities, and drainage facilities. Cut and fill requirements may require either additional right-of-way or construction easements. Obtaining construction easements is becoming the more common practice for urban thoroughfare construction.

If there is sufficient bicycle travel along the thoroughfare to justify a bicycle lane or bikeway, additional right-of-way may be required to contain the bicycle facilities. The North Carolina Bicycle Facilities Planning and Design Guidelines should be consulted for design standards for bicycle facilities. **Cross sections N, O, and P** are typically used to accommodate bicycle travel.

B. LEVEL OF SERVICE CAPACITY

Capacity and Level of Service are terms used to describe how a road handles the traffic it carries. Capacity is defined as the maximum number of vehicles which has a reasonable expectation of passing over a given section of road during a given time period under prevailing roadway and traffic conditions. The most common unit used for capacity is vehicles per day. And Level of Service describes the relationship between the capacity of a road and the volume of traffic that road is forced to carry. Six levels are used to decribe the service of a road under various speed and volume conditions. They are:

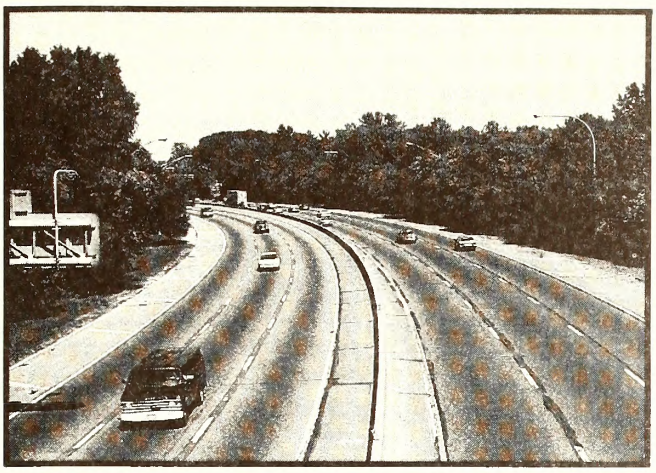
Level of Service A represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high. The general level of comfort and convenience provided to the motorist, passenger, or pedestrian are excellent.

Level of Service B is in the range of stable flow, but the presence of the other users in the traffic stream begins to be noticable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver within the traffic stream. The level of comfort and convenience provided is somewhat less than at LOS A because the presence of others begins to affect individual behavior.

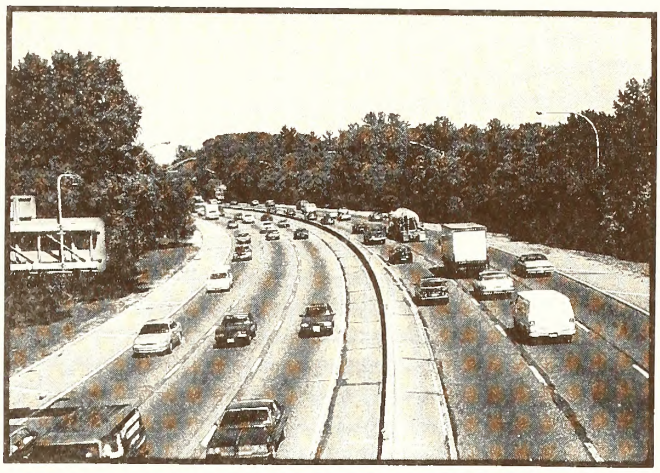
Level of Service C is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream. The selection of speed is now affected by the presence of others, and maneuvering within the traffic stream requires substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably at this level.

FIGURE H–2

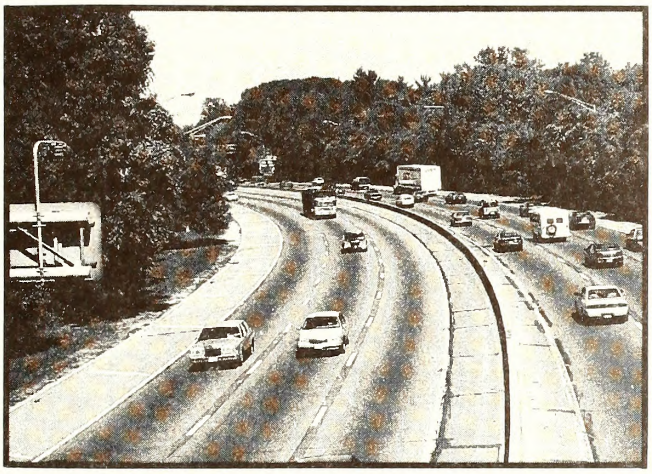
Source: 1994 Highway Capacity Manual



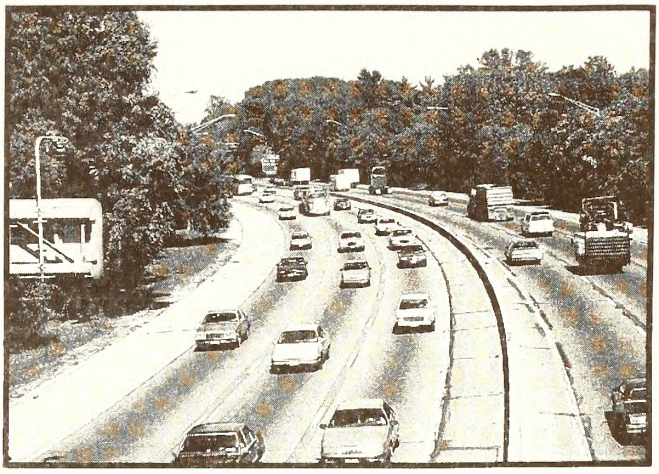
LOS A.



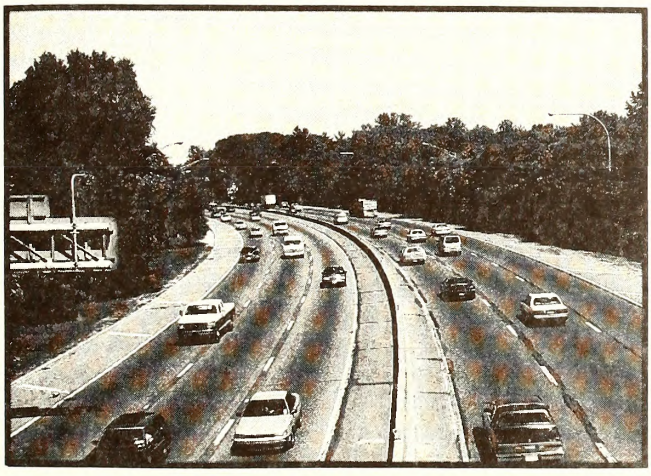
LOS D.



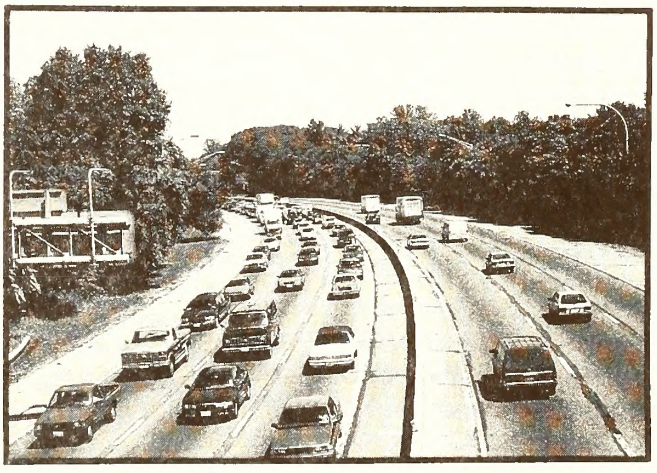
LOS B.



LOS E.



LOS C.



LOS F.

LEVELS OF SERVICE

Level of Service D represents high-density, but stable flow. Speed and freedom to maneuver are severely restricted, and the driver or pedestrian experiences a generally poor level of comfort and convenience. Small encreases in traffic flow will generally cause operational problems at this level.

Level of Service E represents operation conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform value. Freedom to maneuver within the traffic stream is extremely difficult, and it is generally accomplished by forcing a vehicle or pedestrian to "give way" to accomodate such maneuvers. Comfort and convenience levels are extremely poor, and driver or pedestrian frustration is generally high. Operations at this level are usually unstable because small increases in flow or minor agitation within the traffic stream will cause breakdowns.

Level of Service F is used to define forced or brakedown flow. This condition exists wherever the amount of traffic approaching a point exceeds the theoretical amount which can traverse the point. Queues form behind such locations. It is the point at which arrival flow exceeds discharge flow which causes the queue to form. Operations within the queue are characterized by stop-and-go waves, and they are extremely unstable. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion. Level of Service F is used to describe the operating conditions within the queue, as well as the point of the breakdown. It should be noted, however, that in many cases operating conditions of vehicles or pedestrians discharged from the queue may be quite good.

Generally, Level of Service D is accepted by the planning profession as the "practical capacity" of a highway and an urban facility operating below that level of service is operating below tolerance. Table H-1 shows the "practical capacities" of a selection of urban facilities at Level of Service D. Figure H-1 is a pictorial illustration of the above definitions.

Table H-1
Practical Capacity for Urban Facility

Highway Type	Lanes	Vehicles per Day
urban arterial	2	8000-12000
urban arterial	3*	12000-16000
urban arterial	4	18000-22000
urban arterial	5*	24000-28000
urban arterial	6	30000-34000
urban arterial	7*	36000-40000
urban freeway	4	40000-60000
urban freeway	6	60000-80000

* Continuous turn lane or at key locations

C. MINIMUM LANE WIDTHS

For driver convenience, ease of operations. and safety, it would be desirable to widen all existing roads and highways to provide a minimum lane width of 3.6 meters (12 feet). However, when considering overall statewide needs and available highway revenue, it has been found that this level of improvement applied statewide would be impractical. Therefore, it is necessary to establish minimum tolerable widths for existing roads with respect to traffic demend and economic feasibility. There are a number of roads in the Urban Area that have substandard widths. Because of the substantial cost of upgrading all secondary roads to standard, narrower widths may have to be tolerated until sufficient funds are available for improvement. The established traffic and corresponding widths used in determining recommended crossections are given in Table H-2.

Table H-2
Minimum Tolerable Lane Widths*

ADT	Principal Arterials	Minor Arterials	Collectors
below 100	-	-	9
100-400	-	10	9
400-2000	-	10	10
over 2000	11	11	11

* North Carolina Standards for highway construction

D. STREET SYSTEM INDEX

Table H-3 contains a detailed listing of all the streets on the Thoroughfare Plan and the recommended right-of-way widths and thoroughfare cross sections for each along with other pertinent information.

SECTION	Existing Cross-section										Recommended Cross-section					
	loc	dist (km)	rdwy (m)	row (m)	dist (mi)	rdwy (ft)	row (ft)	lane (#)	Cap93 (veh)	1993 ADT	Cap20 (veh)	2020 ADT	rdwy (X)	row (m)	rdwy (X)	row (ft)
AIRPORT RD-HOMER CORRIHER RD (SR 1182,1198)																
NC 153 -- Cannon Farm Rd	lan	1.35	6.0	18.3	0.84	20	60	2	6500	200	8000	1600	6.6	ADQ	22	ADQ
Cannon Farm Rd -- West A St	lan	1.65	--	--	1.02	--	--	--	--		8000	2200	6.6	18	22	60
West A St -- Main St	lan	0.95	6.0	18.3	0.59	20	60	2	6500	440	8000	2900	6.6	ADQ	22	ADQ
ALEXANDER AV																
Robinson Church Rd -- Stallings Rd	har	0.45	--	--	0.28	--	--	--	--		16000	3500	H	18	H	60
Stallings Rd -- Alexander Dr	har	0.52	--	--	0.32	--	--	--	--		16000	6500	H	18	H	60
Alexander Dr -- NC 49	har	0.27	5.4		0.17	18		2	5000	1100	16000	6500	H	18	H	60
ARCHIBALD RD (SR 1153)																
Rocky River Rd -- Zion Church Rd	cab	1.79	6.6	18.3	1.11	22	60	2	8000	650	8000	4100	ADQ	ADQ	ADQ	ADQ
BLACKWELDER Rd (SR 1307)																
Roberta Rd -- NC 49	con	1.94	6.0	18.3	1.20	20	60	2	6500	390	16000	11200	H	21	H	70
BOSTIAN RD (SR 1221)																
US29 -- Old Beattys Ford Rd	row	1.66	6.0	18.3	1.03	20	60	2	6500	400	6500	1500	ADQ	ADQ	ADQ	ADQ
BRANTLEY RD (SR 2000)																
Lane St -- Midlake Av	kan	1.95	5.4	18.3	1.21	18	60	2	5000	2200	8000	3300	6.6	ADQ	22	ADQ
Midlake Av -- Old Salisbury Rd	cab	3.34	5.4	18.3	2.07	18	60	2	5000	700	8000	2500	6.6	ADQ	22	ADQ
BROOKWOOD AV																
Burrage Rd -- Church St	con	1.10	9.0	15.2	0.68	30	50	2	12000	3900	12000	7100	I	21	I	70
Church St -- McGill Av	con	1.50	--	--	0.93	--		--	--	--	12000	7500	I	21	I	70
BROWN RD (SR 1211)																
PAB -- NC 152	row	1.34	5.4	18.3	0.83	18	60	2	5000	900	6500	1300	6.0	ADQ	20	ADQ

L*-eight lanes ADQ-adequate B*-substandard

SECTION	Existing Cross-section										Recommended Cross-section					
	loc	dist (km)	rdwy (m)	row (m)	dist (mi)	rdwy (ft)	row (ft)	lane (#)	Cap93 (veh)	1993 ADT	Cap20 (veh)	2020 ADT	rdwy (X)	row (m)	rdwy (X)	row (ft)
BURRAGE RD																
Lake Concord Rd -- NC 136	con	0.89	14.0	18.3	0.55	46	60	2	10000	2200	12000	4500	ADQ	ADQ	ADQ	ADQ
NC 136 -- Brookwood Rd	con	1.97	14.0	18.3	1.22	46	60	2	10000	2700	12000	6100	ADQ	ADQ	ADQ	ADQ
Brookwood Rd -- Old Salisbury Rd	con	1.48	14.0	18.3	0.92	46	60	2	10000		12000	3100	ADQ	ADQ	ADQ	ADQ
CABARRUS AV (SR 1002)																
US 29 -- Corban Av	con	1.69	14.6	21.3	1.05	48	70	4	18000	10900	18000	12000	ADQ	ADQ	ADQ	ADQ
Corban Av -- Union St	con	1.66	10.8	21.3	1.03	36	70	2	12000	12400	18000	11600	G	21	G	70
Union St -- NC 136	con	1.11	7.6	15.2	0.69	25	50	2	10000	10000	18000	10500	G	21	G	70
CALDWELL RD (SR 1173)																
Tom Query Rd -- NC 49	har	1.40	6.0	18.3	0.87	20	60	2	6500	2200	10000	6000	K	21	K	70
NC 49 -- US 29	har	3.70	--	--	2.30	--	--	--	--		10000	5000	K	21	K	70
CANNON FARM RD (SR 1197)																
Enochville Av -- NC 153	row	4.29	5.4	18.3	2.66	18	60	2	5000	1800	10000	2200	K	ADQ	K	ADQ
CENTERGROVE RD (SR 2114)																
NC 136 -- Forestbrook Dr	kan	0.85	6.0	18.3	0.53	20	60	2	6500		8000	5500	6.6	ADQ	22	ADQ
Forestbrook Dr -- Penninger Rd	cab	3.87	6.0	18.3	2.40	20	60	2	6500	3500	8000	5000	6.6	ADQ	22	ADQ
CENTERVIEW DR																
Main St -- Bostian Rd	cg	0.32	7.6		0.20	25		2	10000		10000	3000	ADQ	ADQ	ADQ	ADQ
Bostian Rd -- US 29	cg	0.32	7.6		0.20	25		2	10000	2000	10000	2500	ADQ	ADQ	ADQ	ADQ
CENTRAL DR																
NC 73 -- US 29	con	0.50	10.8	18.3	0.31	36	60	2	12000	10600	18000	12200	G	21	G	70

L*-eight lanes ADQ-adequate B*-substandard

SECTION	Existing Cross-section										Recommended Cross-section					
	loc	dist (km)	rdwy (m)	row (m)	dist (mi)	rdwy (ft)	row (ft)	lane (#)	Cap93 (veh)	1993 ADT	Cap20 (veh)	2020 ADT	rdwy (X)	row (m)	rdwy (X)	row (ft)
CHINA GROVE RD (SR 1238,2202)																
US29 -- Old Beattys Ford Rd	row	4.61	6.0	18.3	2.86	20	60	2	6500	700	8000	5100	6.6	ADQ	22	ADQ
Old Beattys Ford Rd -- Lane St	kan	1.98	6.0	18.3	1.98	20	60	2	6500	950	8000	2800	6.6	ADQ	22	ADQ
Lane St -- Brantley St	kan	0.58	6.0	18.3	0.58	20	60	2	6500	1100	8000	1500	6.6	ADQ	22	ADQ
CHESTNUT DR																
Lincoln St -- Union St	con	0.37	5.4	12.2	0.23	18	40	2	5000		8000	5900	6.6	18	22	60
CHURCH ST (SR 1337)																
NC 152 -- Main St	cg	2.58	6.0	18.3	1.60	20	60	2	6500	7000	12000	5500	I	21	I	70
Main St -- US 29	cg	0.31	9.8	18.3	0.31	32	60	2	12000	4500	12000	7300	ADQ	ADQ	ADQ	ADQ
CHURCH ST (US 601BUS,NC 73)																
US 29 -- Todd Dr	con	1.61	15.5	21.3	1.00	51	70	2	20000	22600	28000	17100	C	27	C	90
Todd Dr -- Douglas Av	con	0.44	12.2	21.3	0.27	40	70	3	16000		16000	14200	ADQ	ADQ	ADQ	ADQ
Douglas Av -- Cabarrus Av	con	1.48	10.7	18.3	0.92	35	60	2	12000	17100	16000	12300	H	18	H	60
Cabarrus Av -- Means Av	con	0.13	16.5	18.3	0.08	54	60	2	24000	11200	24000	9000	ADQ	ADQ	ADQ	ADQ
Means Av -- Corban Av	con	0.13	16.5	18.3	0.08	54	60	2	24000		24000	9000	ADQ	ADQ	ADQ	ADQ
COLDWATER CONNECTOR																
Copperfield Blvd -- Penninger Rd	cab	2.02	--	--	1.25	--	--	--	--	--	18000	10000	G	21	G	70
CONCORDIA CHURCH RD (SR 1353)																
PAB -- NC 152	row	0.16	6.7	18.3	0.10	22	60	2	8000	260	8000	500	ADQ	ADQ	ADQ	ADQ
COPPERFIELD BLVD																
I-85 -- Coldwater Connector	con	0.55	20.1		0.34	66		5	28000		28000	20200	ADQ	ADQ	ADQ	ADQ
Coldwater Connector -- NC 136	con	2.18	20.1		1.35	66		5	28000	700	28000	11000	ADQ	ADQ	ADQ	ADQ

L*-eight lanes ADQ-adequate B*-substandard

SECTION	Existing Cross-section										Recommended Cross-section					
	loc	dist (km)	rdwy (m)	row (m)	dist (mi)	rdwy (ft)	row (ft)	lane (#)	Cap93 (veh)	1993 ADT	Cap20 (veh)	2020 ADT	rdwy (X)	row (m)	rdwy (X)	row (ft)
CORBAN AV																
Powder St -- Union St	con	1.60	6.7		0.99	22		2	8000	3100	9600	6300	J	18	J	60
CRESTMONT DR (SR 2643)																
Old Salisbury Rd -- NC 73	cab	1.98	--	--	1.23	--	--	--	--	--	16000	6100	H	21	H	70
NC 73 -- Old Airport Rd	con	3.19	5.5	18.3	1.98	18	60	2	5000	1000	16000	9000	H	21	H	70
Old Airport Rd -- NC 49	cab	1.69	--	--	1.05	--	--	--	--	--	16000	8300	H	21	H	70
NC 49 -- US 601	con	1.35	--	--	0.84	--	--	--	--	--	16000	7000	H	21	H	70
DAKOTA ST																
Westside Conn -- Main St	kan	3.82	--	--	2.37	--	--	--	--		9600	5900	J	18	J	60
Main St -- Ridge Av	kan	0.27	--	--	0.17	--	--	--	--		9600	7400	J	18	J	60
Ridge Av -- US 29	kan	0.89	7.3		0.55	24		2	9600	1400	9600	7900	ADQ	18	ADQ	60
US 29 -- NC 136	kan	0.97	--	--	0.60	--	--	--	--		9600	3500	J	18	J	60
NC 136 -- Dale Earnhardt Blvd	kan	0.97	--	--	0.60	--	--	--	--		9600	2800	J	18	J	60
DALE EARNHARDT BLVD (SR 2126)																
I-85 -- Old Earnhardt Rd	kan	0.71	7.3		0.44	24		2	10000		28000	11500	C	27	C	90
Old Earnhardt Rd -- NC 136	kan	0.89	--	--	0.55	--	--	--	--		28000	9000	C	27	C	90
DEAL RD (SR 1353)																
PAB -- Unity Rd	row	1.84	5.5	18.3	1.14	18	60	2	5000	1800	8000	1900	6.6	ADQ	22	ADQ
Unity Rd -- Wright Rd	row	1.77	5.5	18.3	1.10	18	60	2	5000	1340	8000	3500	6.6	ADQ	22	ADQ
Wright Rd -- Enochville Rd	row	2.42	5.5	18.3	1.50	18	60	2	5000		8000	740	6.6	ADQ	22	ADQ
Enochville Rd -- NC 152	row	1.05	5.5	18.3	0.65	18	60	2	5000	1530	8000	3000	6.6	ADQ	22	ADQ
DERITA RD (SR 1445)																
Poplar Tent Rd -- Kings Grant Blvd	con	4.35	5.5	18.3	2.70	18	60	2	5000	720	18000	14000	G	21	G	70
Kings Grant Blvd -- Meck Co	con	0.16	5.5	18.3	0.10	18	60	2	5000		18000	9900	G	21	G	70

L*-eight lanes ADQ-adequate B*-substandard

SECTION	Existing Cross-section										Recommended Cross-section					
	loc	dist (km)	rdwy (m)	row (m)	dist (mi)	rdwy (ft)	row (ft)	lane (#)	Cap93 (veh)	1993 ADT	Cap20 (veh)	2020 ADT	rdwy (X)	row (m)	rdwy (X)	row (ft)
DOGWOOD BLVD (SR 1838)																
Trinity Church Rd -- Westside Conn	cab	1.58	5.5	18.3	0.98	18	60	2	5000	180	8000	1400	6.6	ADQ	22	ADQ
Westside Conn -- Rogers Lake Rd	kan	1.75	--	--	1.10	--	--	--	--		8000	1000	6.6	21	22	70
DRAKESIDE RD (SR 1622)																
Stirewalt Rd -- Trinity Church Rd	cab	1.05	6.1	18.3	0.65	20	60	2	6500	500	8000	5200	6.6	ADQ	22	ADQ
EBENEZER RD (SR 1267,1322)																
Ridge Av -- US 29	kan	0.34	5.5	18.3	0.21	18	60	2	5000	3200	5000	200	ADQ	ADQ	ADQ	ADQ
US 29 -- Evelyn Ext	row	2.08	5.5	18.3	1.29	18	60	2	5000	1400	8000	2600	6.6	ADQ	22	ADQ
Evelyn Ext -- Old Beattys Ford Rd	row	1.00	5.5	18.3	0.62	18	60	2	5000	800	8000	3200	6.6	ADQ	22	ADQ
ENOCHVILLE AV (SR 1351)																
Tuckasseegee Rd -- West C ST	row	0.94	5.5	18.3	0.58	18	60	2	5000	5500	8000	3000	6.6	ADQ	22	ADQ
West C St -- Upper Enochville Av	row	1.58	5.5	18.3	0.98	18	60	2	5000	6400	8000	4000	6.6	ADQ	22	ADQ
Upper Enochville Av -- Cannon Farm Rd	row	0.50	5.5	18.3	0.31	18	60	2	5000	5700	8000	3000	6.6	ADQ	22	ADQ
Cannon Farm Rd -- Enochville Rd	row	0.58	5.5	18.3	0.36	18	60	2	5000	3400	8000	2400	6.6	ADQ	22	ADQ
ENOCHVILLE RD (SR 1351)																
Enochville Av -- Westside Conn	row	0.98	5.5	18.3	0.61	18	60	2	5000		5000	400	ADQ	ADQ	ADQ	ADQ
Westside Conn -- Deal Rd	row	2.55	5.5	18.3	1.58	18	60	2	5000	1000	8000	3700	6.6	ADQ	22	ADQ
ENOCHVILLE SCHOOL RD (SR 1360)																
Wright Rd -- Westside Conn	row	2.73	5.5	18.3	1.69	18	60	2	5000		8000	3500	6.6	ADQ	22	ADQ
Westside Conn -- Enochville Av	row	1.02	5.5	18.3	0.63	18	60	2	5000	1400	8000	900	6.6	ADQ	22	ADQ
EVELYN ST																
Ebeneezer Rd -- Moose Rd	kan	1.53	--	--	0.95	--	--	--	--		9600	1200	J	18	J	60
Moose Rd -- Lane St	kan	0.76	5.5		0.47	18		2	5000		9600	500	J	18	J	60
Lane St -- Brantley Rd	kan	0.47	5.5		0.29	18		2	5000		9600	500	J	18	J	60

L*-eight lanes ADQ-adequate B*-substandard

SECTION	Existing Cross-section										Recommended Cross-section					
	loc	dist (km)	rdwy (m)	row (m)	dist (mi)	rdwy (ft)	row (ft)	lane (#)	Cap93 (veh)	1993 ADT	Cap20 (veh)	2020 ADT	rdwy (X)	row (m)	rdwy (X)	row (ft)
FIRST ST (SR 1706)																
Main St -- US 29	kan	0.86	6.1	18.3	0.86	20	60	2	6500	4000	8000	3800	6.6	ADQ	22	ADQ
US 29 -- Midlake Av	kan	2.47	6.1	18.3	1.53	20	60	2	6500	1400	6500	1800	ADQ	ADQ	ADQ	ADQ
FLAT ROCK RD (SR 1210)																
NC 152 -- Landis CL	row	2.58	5.5	18.3	1.60	18	60	2	5000	1500	8000	2500	6.6	ADQ	22	ADQ
Landis CL -- Moriah Church Rd	lan	0.32	9.1	18.3	0.20	30	60	2	12000		12000	2800	ADQ	ADQ	ADQ	ADQ
FLOWES STORE RD (SR 1132)																
US 601 -- PAB	cab	4.82	6.7	18.3	2.99	22	60	2	8000	8600	16000	9800	H	21	H	70
GOLD HILL RD (SR 2408)																
NC 73 -- Crestmont Rd	cab	0.19	7.3	18.3	0.12	24	60	2	10000	1000	10000	5000	ADQ	21	ADQ	70
Crestmont Rd -- PAB	cab	2.00	7.3	18.3	1.24	24	60	2	10000	2140	10000	9900	ADQ	21	ADQ	70
HARRIS RD (SR 1449)																
Odell School Rd -- Meck Co	cab	3.97	5.5	18.3	2.46	18	60	2	5000	820	10000	8000	K	ADQ	K	ADQ
HICKORY RIDGE RD (SR 1138)																
Rocky River Rd -- Stallings Rd	har	2.03	5.5	18.3	1.26	18	60	2	5000	1600	8000	4000	6.6	ADQ	22	ADQ
Railroad Av -- School Circle	har	0.71	5.5	18.3	0.44	18	60	2	5000	2600	8000	2000	6.6	ADQ	22	ADQ
INDUSTRIAL PARK RD																
Caldwell Rd -- End	har	0.26	11.0	18.3	0.10	36	60	2	12000		12000	4000	ADQ	ADQ	ADQ	ADQ
End -- Stallings Rd	har	0.32	--	--	0.20	--	--	--	--	--	16000	4500	H	18	H	60
INTERNATIONAL DR (SR 1429)																
NC 73 -- Poplar Tent Rd	con	2.24	8.5	18.3	1.39	28	60	2	10000	4400	10000	5800	ADQ	ADQ	ADQ	ADQ

L*-eight lanes ADQ-adequate B*-substandard

SECTION	Existi ng Cross-section										Recommended Cross-section					
	loc	dist (km)	rdwy (m)	row (m)	dist (mi)	rdwy (ft)	row (ft)	lane (#)	Cap93 (veh)	1993 ADT	Cap20 (veh)	2020 ADT	rdwy (X)	row (m)	rdwy (X)	row (ft)
INTERSTATE 85																
PAB -- US 29	cg	1.27	14.6	88.4	0.79	48	290	4	60000		120000	91400	L*	91	L*	300
US 29 -- NC 152	cg	1.24	14.6	88.4	0.77	48	290	4	60000	48640	120000	87000	L*	91	L*	300
NC 152 -- Old Beattys Ford Rd	row	5.18	15.2	88.4	3.21	50	290	4	60000		120000	98800	L*	91	L*	300
Old Beattys Ford Rd -- Lane St	row	3.32	15.2	94.5	2.06	50	310	4	60000	46560	120000	101300	L*	ADQ	L*	ADQ
Lane St -- Dale Earnhardt Blvd	kan	4.27	15.2	94.5	2.65	50	310	4	60000		120000	106800	L*	ADQ	L*	ADQ
Dale Earnhardt Blvd -- Cannon Blvd	con	3.05	14.6	94.5	1.89	48	310	4	60000		120000	96200	L*	ADQ	L*	ADQ
Cannon Blvd -- NC 73	con	4.74	15.2	94.5	2.94	50	310	4	60000	47400	120000	101600	L*	ADQ	L*	ADQ
NC 73 -- Westside Connector	con	2.32	15.2	103.7	1.44	50	340	4	60000		120000	100100	L*	ADQ	L*	ADQ
Westside Connector -- Poplar Tent Rd	con	3.08	15.2	103.7	1.91	50	340	4	60000		120000	104200	L*	ADQ	L*	ADQ
Poplar Tent Rd -- Speedway Blvd	cab	3.94	15.2	103.7	2.44	50	340	4	60000		120000	107400	L*	ADQ	L*	ADQ
Speedway Blvd -- Meck Co	cab	0.07	15.5	103.7	0.04	50	340	4	60000	52660	120000	98000	L*	ADQ	L*	ADQ
KERR ST																
McGill St -- Cabarrus Av	con	1.61	5.5	12.2	1.00	18	40	2	5000	5000	9600	7000	J	18	J	60
KIMBALL RD (SR 1211)																
Patterson Rd -- Main St	row	2.26	7.3	18.3	1.40	24	60	2	10000	1020	10000	3400	ADQ	ADQ	ADQ	ADQ
Main St -- US 29	row	1.26	--	--	0.78	--	--	--	--		9600	1300	J	18	J	60
LAKE CONCORD RD (SR 2081)																
Burrage Rd -- Church St	con	0.47	15.5	18.3	0.29	51	60	4	20000	9300	20000	4000	ADQ	21	ADQ	70
LENTZ RD (SR 1337)																
US 29 -- NC 152 Conn	cg	2.87	5.5	18.3	1.78	18	60	2	5000	1300	8000	4000	6.6	ADQ	22	ADQ
NC 152 Conn -- Old Beattys Ford Rd	row	2.43	5.5	18.3	2.43	18	60	2	5000	1200	8000	2900	6.6	ADQ	22	ADQ
LENTZ-NC 152 CONNECTOR																
Lentz -- NC 152	row	1.06	--	--	0.66	--	--	--	--		10000	3200	K	21	K	70

L*-eight lanes ADQ-adequate B*-substandard

SECTION	Existi ng Cross-section										Recommended Cross-section					
	loc	dist (km)	rdwy (m)	row (m)	dist (mi)	rdwy (ft)	row (ft)	lane (#)	Cap93 (veh)	1993 ADT	Cap20 (veh)	2020 ADT	rdwy (X)	row (m)	rdwy (X)	row (ft)
LINCOLN ST																
Chestnut Dr -- US 601	con	2.42	5.5	12.2	1.50	18	40	2	5000	1500	8000	7100	6.6	18	22	60
LITTLE TEXAS RD (SR 2154)																
Brantley Av -- NC 136	kan	3.26	8.2	18.3	2.02	27	60	2	10000	3800	10000	5200	ADQ	ADQ	ADQ	ADQ
LOOP-JACKSON PARK-LANE ST																
NC 136 -- Main St	kan	1.68	14.6	21.3	1.04	48	70	4	18000	17100	18000	12500	ADQ	ADQ	ADQ	ADQ
Main St -- US 29	kan	1.02	14.6	21.3	0.63	48	70	4	18000	10000	18000	10500	ADQ	ADQ	ADQ	ADQ
US 29 -- Wright Av	kan	1.71	14.6	21.3	1.06	48	70	4	18000		18000	9000	ADQ	ADQ	ADQ	ADQ
Wright Av -- I-85	row	4.24	13.4	18.3	1.63	44	60	4	18000	6600	18000	8000	G	21	G	70
I-85 -- Old Salisbury Rd	row	2.55	7.9	18.3	1.58	26	60	2	10000	7600	18000	8900	G	21	G	70
MAIN ST (US 29A)																
PAB -- NC 152	cg	1.63	12.5	18.3	1.01	41	60	2	16000	9340	16000	15000	H	ADQ	H	ADQ
NC 152 -- Church St	cg	0.97	11.0	18.3	0.60	36	60	3	16000	9400	16000	7500	ADQ	ADQ	ADQ	ADQ
Church St -- Kimball Rd	cg	2.79	11.0	18.3	1.73	36	60	2	16000	8600	16000	4300	ADQ	ADQ	ADQ	ADQ
Kimball Rd -- NC 153	lan	2.18	9.1	18.3	1.35	30	40	2	12000	7700	16000	5500	H	18	H	60
NC 153 -- 22nd St	lan	2.61	9.1	18.3	1.62	30	60	2	12000	8680	16000	10000	H	ADQ	H	ADQ
22nd St -- Jackson Park Rd	kan	2.16	9.5	18.3	1.34	31	60	2	12000	8500	16000	13600	H	ADQ	H	ADQ
Jackson Park Rd -- NC 136	kan	1.95	10.7	18.3	1.21	35	60	2	16000	7700	16000	6000	H	ADQ	H	ADQ
NC 136 -- Universal St	kan	1.50	12.2	18.3	0.93	40	60	2	16000	11000	16000	7000	H	ADQ	H	ADQ
Universal St -- Dakota St	kan	1.18	13.4	18.3	0.73	44	60	3	16000	12200	16000	9300	ADQ	ADQ	ADQ	ADQ
Dakota St -- Winecoff School Av	kan	1.97	7.3	18.3	1.22	24	60	2	10000	11900	16000	9400	H	ADQ	H	ADQ
Winecoff School Av -- US 29	con	1.29	7.9	18.3	0.78	26	60	2	10000	13200	16000	11800	H	ADQ	H	ADQ
MALL RD																
US 29 -- NC 136	con	0.98	--	--	0.61	--	--	--	--	--	28000	13000	C	27	C	90

L*-eight lanes ADQ-adequate B*-substandard

SECTION	Existi ng Cross-section										Recommended Cross-section					
	loc	dist (km)	rdwy (m)	row (m)	dist (mi)	rdwy (ft)	row (ft)	lane (#)	Cap93 (veh)	1993 ADT	Cap20 (veh)	2020 ADT	rdwy (X)	row (m)	rdwy (X)	row (ft)
MCGILL ST																
US 29 -- Brookwood Ext	con	0.97	13.7	15.2	0.60	45	50	4	20000	9600	20000	14500	ADQ	21	ADQ	70
Brookwood Ext -- Spring St	con	0.77	11.0	15.2	0.48	36	50	2	15000	5800	18000	3300	G	21	G	70
Spring St -- Church St	con	0.48	12.2	15.2	0.30	40	50	2	16000	6500	18000	4400	G	21	G	70
MIDLAKE AV (SR 2198)																
Brantley Av -- Centergrove Rd	kan	1.69	6.1	18.3	1.05	20	60	2	6500	2100	8000	3500	6.6	ADQ	22	ADQ
MILLER RD (SR 1509)																
PAB -- NC 152 Bypass	row	2.44	7.9	18.3	1.51	26	60	2	10000	2000	10000	4200	ADQ	ADQ	ADQ	ADQ
NC 152 Bypass -- Church St	cg	0.48	7.9	18.3	0.30	26	60	2	10000	2400	10000	2800	ADQ	ADQ	ADQ	ADQ
MOOSE RD (SR 1308)																
Ebeneezer Rd -- Wright Av	kan	1.92	6.7	18.3	1.19	22	60	2	8000	3000	8000	2700	ADQ	ADQ	ADQ	ADQ
Wright Av -- China Grove Rd	kan	1.40	6.7	18.3	0.87	22	60	2	8000	2540	8000	3100	ADQ	ADQ	ADQ	ADQ
China Grove Rd -- Turkey Rd	row	1.50	5.5	18.3	0.93	18	60	2	5000	1100	5000	2000	6.6	ADQ	22	ADQ
Turkey Rd -- Old Beattys Ford Rd	row	2.81	5.5	18.3	1.74	18	60	2	5000	750	5000	2500	6.6	ADQ	22	ADQ
MOREHEAD RD (SR 1300)																
NC 49 -- Mallard Creek	har	1.56	7.3	18.3	0.97	24	60	2	10000	10000	16000	13000	H	18	H	60
Mallard Creek -- US 29	con	2.68	9.1	18.3	1.66	30	60	2	12000	15100	28000	15000	C	27	C	90
MT MORIAH CHURCH RD (SR 1197)																
NC 153 -- Connector	lan	1.85	5.5	18.3	1.15	18	60	2	5000	2900	8000	2800	6.6	ADQ	22	ADQ
Connector -- Main St	lan	0.76	5.5	18.3	0.47	18	60	2	5000	2200	8000	2000	6.6	ADQ	22	ADQ

L*-eight lanes ADQ-adequate B*-substandard

SECTION	Existi ng Cross-section										Recommended Cross-section					
	loc	dist (km)	rdwy (m)	row (m)	dist (mi)	rdwy (ft)	row (ft)	lane (#)	Cap93 (veh)	1993 ADT	Cap20 (veh)	2020 ADT	rdwy (X)	row (m)	rdwy (X)	row (ft)
MT MORIAH CHURCH-NC 152 CONNECTOR																
Mt Moriah Church Rd -- Kimball Rd	lan	0.58	--	--	0.36	--	--	--	--		9600	300	J	18	J	60
Kimball Rd -- Patterson St	cg	1.27	--	--	0.79	--	--	--	--		9600	2900	J	18	J	60
Patterson St -- NC 152	cg	0.44	--	--	0.27	--	--	--	--		9600	2600	J	18	J	60
NC 49																
PAB -- Crestmont Ext	con	0.65	7.3	18.3	0.40	24	60	2	10000	9700	35000	16000	F	33	F	110
Crestmont Ext -- US 601	con	0.69	12.8	18.3	0.43	42	60	2	16000	9900	35000	18100	F	33	F	110
US 601 -- Zion Church Rd	con	2.60	7.6	18.3	1.61	25	60	2	10000	9800	35000	19700	F	33	F	110
Zion Church Rd -- Old Charlotte Rd	con	1.87	7.6	18.3	1.16	25	60	2	10000	14200	35000	28600	F	33	F	110
Old Charlotte Rd -- Westside Conn	con	1.70	7.6	18.3	1.05	25	60	2	10000	13300	35000	38400	F	33	F	110
Westside Conn -- Blackwelder Rd	con	1.50	7.3	18.3	0.93	24	60	2	10000	13800	35000	32300	F	33	F	110
Blackwelder Rd -- Northern Connector	har	2.60	7.3	30.5	1.61	24	100	2	10000	13420	35000	27000	F	33	F	110
Northern Connector -- Roberta Rd	har	0.48	7.3	30.5	0.30	24	100	2	10000	15000	36000	30000	B*	33	B*	110
Roberta Rd -- Robinson Church Rd	har	0.65	14.6	30.5	0.40	48	100	4	20000	15100	36000	32000	B*	33	B*	110
Robinson Church Rd -- Morehead Rd	har	0.45	14.6	30.5	0.28	48	100	4	20000	19600	36000	31000	B*	33	B*	110
Morehead Rd -- Caldwell Rd	har	1.38	7.3	30.5	0.86	24	100	2	10000	17200	36000	31000	B*	33	B*	110
Caldwell Rd -- Meck Co	har	0.82	7.3	30.5	0.51	24	100	2	10000	16700	36000	34000	B*	33	B*	110
NC 73																
Meck Co -- Odell School Rd	cab	3.40	7.3	18.3	2.11	24	60	2	10000	4400	28000	12300	C	27	C	90
Odell School Rd -- Westside Conn	cab	4.50	7.3	18.3	2.79	24	60	2	10000	6500	28000	17200	C	27	C	90
Westside Conn -- Trinity Church Rd	cab	1.51	7.3	18.3	0.94	24	60	2	10000	9500	28000	12600	C	27	C	90
Trinity Church Rd -- I-85	kan	0.27	7.3	18.3	0.17	24	60	2	10000	14500	28000	28200	C	27	C	90
I -85 -- International Dr	con	0.35	5.5	18.3	0.22	18	60	2	5000	13200	28000	20500	C	27	C	90
International Dr -- Winecoff School Rd	con	2.68	5.5	18.3	1.66	18	60	2	5000	10000	28000	14000	C	27	C	90
Winecoff School Rd -- Central Av	con	0.92	5.5	18.3	0.57	18	60	2	5000	10800	28000	13200	C	27	C	90
Central Av -- US 29	con	1.40	5.5	18.3	0.87	18	60	2	5000	7100	16000	9200	H	ADQ	H	ADQ
Church St -- NC 136	con	0.94	9.8	18.3	0.58	32	60	2	12000	10400	28000	13300	C	27	C	90
NC 136 -- Crestmont Rd	con	2.11	7.3	18.3	1.31	24	60	2	10000	11900	28000	16100	C	27	C	90

L*-eight lanes ADQ-adequate B*-substandard

SECTION	Existi ng Cross-section										Recommended Cross-section					
	loc	dist (km)	rdwy (m)	row (m)	dist (mi)	rdwy (ft)	row (ft)	lane (#)	Cap93 (veh)	1993 ADT	Cap20 (veh)	2020 ADT	rdwy (X)	row (m)	rdwy (X)	row (ft)
Crestmont Rd -- PAB	cab	1.15	7.3	18.3	0.71	24	60	2	10000	8600	16000	14800	H	ADQ	H	ADQ
NC 136 (Moorsvle,Loop,Cntrgrve, Concrd Lk,Brchvw)																
Iredell Co -- Tuckasseegee Rd	row	7.55	6.1	30.5	4.68	20	100	2	6500	3760	16000	8900	H	ADQ	H	ADQ
Tuckasseegee Rd -- Westside Conn	row	3.35	6.1	30.5	2.08	20	100	2	6500	4400	16000	8700	H	ADQ	H	ADQ
Westside Conn -- Loop Rd	kan	4.10	6.1	30.5	2.54	20	100	2	6500	6400	16000	11100	H	ADQ	H	ADQ
Loop Rd -- Main St	kan	1.37	14.6	24.4	0.85	48	80	4	20000	13100	20000	14000	ADQ	ADQ	ADQ	ADQ
Main St -- US 29	kan	2.31	14.6	24.4	1.43	48	80	4	20000	15200	20000	16900	ADQ	ADQ	ADQ	ADQ
US 29 -- Earnhardt Rd	kan	1.05	14.6	30.5	0.65	48	100	4	20000	11000	20000	18500	ADQ	ADQ	ADQ	ADQ
Earnhardt Rd -- Mall Rd	kan	3.00	10.1	21.3	1.86	33	70	2	12000	14000	28000	17600	C	27	C	90
Mall Rd -- NC 73	con	5.00	10.1	21.3	3.10	33	70	2	12000	15060	28000	22900	C	27	C	90
NC 73 -- Union St	con	3.20	--	--	1.98	--	--	--	--	--	35000	17200	F	33	F	110
NC 152																
PAB -- Church St	row	7.79	7.3	18.3	4.83	24	60	2	10000	4740	10000	6500	ADQ	21	ADQ	70
Church St -- Shue Rd	cg	2.58	--	--	1.60	--	--	--	--	--	10000	3100	K	21	K	70
Shue Rd -- Main St	cg	1.15	9.8	18.3	0.71	32	60	2	10000	1800	10000	7800	ADQ	21	ADQ	70
Main St -- US 29	cg	0.47	14.6	54.9	0.29	48	180	4	20000	9500	28000	23500	C	ADQ	C	ADQ
US 29 -- I-85	row	0.66	14.6	54.9	0.41	48	180	4	20000	7300	28000	13600	C	ADQ	C	ADQ
I-85 -- Lentz Conn	row	1.53	6.1	18.3	0.95	20	60	2	6500	6900	16000	8900	H	21	H	70
Lentz Conn -- PAB	row	0.42	6.1	18.3	0.26	20	60	2	6500	6000	16000	9000	H	21	H	70
NC 153																
NC 152 -- Cannon Farm Rd	lan	3.94	5.5	18.3	2.44	18	60	2	5000	4240	10000	6400	K	21	K	70
Cannon Farm Rd -- Main St	lan	0.77	10.7	18.3	0.48	35	60	2	12000	4600	16000	4100	H	ADQ	H	ADQ
NORTHERN CORRIDOR																
Morehead Rd -- Roberta Rd	har	2.00	--	--	1.24	--	--	--	--	--	10000	5000	K	21	K	70
Roberta Rd -- NC 49	har	0.95	--	--	0.59	--	--	--	--	--	10000	6000	K	21	K	70

L*-eight lanes ADQ-adequate B*-substandard

SECTION	Existing Cross-section										Recommended Cross-section					
	loc	dist (km)	rdwy (m)	row (m)	dist (mi)	rdwy (ft)	row (ft)	lane (#)	Cap93 (veh)	1993 ADT	Cap20 (veh)	2020 ADT	rdwy (X)	row (m)	rdwy (X)	row (ft)
OAKWOOD AV (SR 1745)																
Rogers Lake Rd -- Orphanage Rd	kan	3.55	7.3	15.2	2.20	24	50	2	10000	3500	10000	6500	ADQ	21	ADQ	70
ODELL SCHOOL RD (SR 1442)																
NC 136 -- Windy Rd	cab	4.20	5.5	18.3	2.60	18	60	2	5000	2520	10000	3800	K	21	K	70
Windy Rd -- NC 73	cab	2.37	5.5	18.3	1.47	18	60	2	5000		10000	6000	K	21	K	70
NC 73 -- Poplar Tent Rd	cab	4.30	5.5	18.3	2.67	18	60	2	5000	3100	18000	9400	G	21	G	70
OLD AIRPORT RD (SR 2635)																
Union St -- Crestmont Rd	con	1.40	5.5	18.3	0.87	18	60	2	5000	2800	8000	3700	6.6	ADQ	22	ADQ
Crestmont Rd -- PAB	con	0.24	5.5	18.3	0.15	18	60	2	5000	1960	8000	2600	6.6	ADQ	22	ADQ
OLD BEATTYS FORD RD (SR 1210,1221)																
US 29 -- Bostian Rd	lan	1.45	5.5	18.3	0.90	18	60	2	5000	1500	8000	1800	6.6	ADQ	22	ADQ
Bostian Rd -- Ebeneezer Rd	row	0.66	5.5	18.3	0.41	18	60	2	5000	1300	8000	2100	6.6	ADQ	22	ADQ
Ebeneezer Rd -- I-85	row	1.27	5.5	18.3	0.79	18	60	2	5000	1500	8000	5600	6.6	ADQ	22	ADQ
I-85 -- Lentz Rd	row	2.90	5.5	18.3	1.80	18	60	2	5000	900	8000	4200	6.6	ADQ	22	ADQ
Lentz Rd -- PAB	row	1.76	5.5	18.3	1.09	18	60	2	5000	1900	8000	3700	6.6	ADQ	22	ADQ
OLD CHARLOTTE RD (SR 1335,1157)																
Cabarrus Av -- US 601	con	1.71	6.7	15.2	1.06	22	50	2	8000	5200	9600	5800	J	18	J	60
US 601 -- Roberta Rd	con	0.55	6.7	18.3	0.34	22	60	2	8000	7900	28000	10100	C	27	C	90
Roberta Rd -- NC 49	con	2.66	5.5	18.3	1.65	18	60	2	5000	8600	18000	12000	G	21	G	70
OLD SALISBURY RD (SR 1002)																
NC 136 -- Penninger Rd	cab	2.15	7.3	18.3	1.33	24	60	2	10000	5200	16000	13400	H	21	H	70
Penninger Rd -- Penninger Rd	cab	2.26	5.5	18.3	1.40	18	60	2	5000	3100	16000	11400	H	21	H	70
Penninger Rd -- Lane St	cab	5.58	5.5	18.3	3.46	18	60	2	5000	2440	10000	6900	K	21	K	70
Lane St -- PAB	row	4.10	5.5	18.3	2.54	18	60	2	5000	2840	10000	6800	K	21	K	70

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SECTION	Existing Cross-section										Recommended Cross-section					
	loc	dist (km)	rdwy (m)	row (m)	dist (mi)	rdwy (ft)	row (ft)	lane (#)	Cap93 (veh)	1993 ADT	Cap20 (veh)	2020 ADT	rdwy (X)	row (m)	rdwy (X)	row (ft)
ORPHANAGE RD (SR 1778)																
Trinity Church Rd -- Winecoff School R	kan	3.16	7.3	15.2	1.96	24	50	2	10000	4000	10000	5300	ADQ	21	ADQ	70
PATTERSON RD (SR 1225)																
Flat Rock Rd -- Grants Creek	row	2.74	5.5	18.3	1.70	18	60	2	5000	1300	10000	1700	K	21	K	70
Grants Creek -- Main St	cg	0.73	7.6	18.3	0.45	25	60	2	10000	2500	10000	2000	ADQ	ADQ	ADQ	ADQ
PENNINGER RD (SR 2113)																
Old Salisbury Rd -- Coldwater Conn	cab	2.85	7.3	18.3	1.77	24	60	2	10000	650	16000	7600	H	21	H	70
Coldwater Conn -- Old Salisbury Rd	cab	1.53	7.3	18.3	0.95	24	60	2	10000	380	10000	6300	ADQ	21	ADQ	70
PHARR MILL RD (SR 1158)																
NC 49 -- Mulberry Rd	cab	0.48	7.3	18.3	0.30	24	60	2	10000	2100	16000	8300	H	21	H	70
MulBerry Rd -- Rocky River Rd	cab	2.74	5.5	18.3	1.70	18	60	2	5000	800	8000	1200	6.6	ADQ	22	ADQ
PITT SCHOOL RD (SR 1305)																
Poplar Tent Rd -- Shelton Rd	cab	0.32	6.1	18.3	0.20	20	60	2	6500		18000	8800	G	21	G	70
Shelton Rd -- US 29	cab	4.66	6.7	18.3	2.89	22	60	2	8000	5940	18000	11600	G	21	G	70
US 29 -- Roberta Rd	con	4.60	6.7	18.3	2.85	22	60	2	8000	3080	18000	10000	G	21	G	70
PLAZA RD EXT (SR 1171,1176)																
Rocky River Rd -- PAB	cab	1.52	5.5	15.2	0.94	18	50	2	5000		16000	7500	H	18	H	60
PLUM RD (SR 1615)																
Unity Rd -- Tuckaseegee Rd	cab	1.95	5.5	18.3	1.21	18	60	2	5000	1300	8000	2600	6.6	ADQ	22	ADQ
POPLAR TENT RD (SR 1394)																
Meck Co -- Derita Rd	cab	5.38	6.1	18.3	3.34	20	60	2	6500	2300	28000	8200	C	27	C	90
Derita Rd -- I-85	cab	1.26	7.3	18.3	0.78	24	60	2	10000	8260	28000	24000	C	27	C	90
I-85 -- Shelton Rd	cab	0.48	7.3	18.3	0.30	24	60	2	10000	6840	28000	19800	C	27	C	90

L*-eight lanes ADQ-adequate B*-substandard

SECTION	Existing Cross-section										Recommended Cross-section					
	loc	dist (km)	rdwy (m)	row (m)	dist (mi)	rdwy (ft)	row (ft)	lane (#)	Cap93 (veh)	1993 ADT	Cap20 (veh)	2020 ADT	rdwy (X)	row (m)	rdwy (X)	row (ft)
Shelton Rd -- Westside Conn	con	2.81	5.5	18.3	1.74	18	60	2	5000	5300	28000	11800	C	27	C	90
Westside Conn -- Rock Hill Church Rd	con	2.52	5.5	18.3	1.56	18	60	2	5000	6300	28000	14300	C	27	C	90
Rock Hill Church Rd -- US 29	con	2.13	6.7	18.3	1.32	22	60	2	8000	8800	28000	13000	C	27	C	90
RAILROAD AV																
Robinson Church Rd -- Hickory Ridge Rd	har	0.29	5.5		0.18	18	--	2	5000		9600	1000	J	18	J	60
RAINBOW DR (SR 1371,1643)																
West C St -- NC 136	kan	3.16	5.5	18.3	1.96	18	60	2	5000	2340	9600	3500	J	18	J	60
NC 136 -- Main St	kan	1.68	6.1	18.3	1.04	20	60	2	6500	3400	9600	4500	J	18	J	60
RANKIN RD (SR 1616)																
NC 136 -- Trinity Church Rd	cab	1.40	5.5	18.3	0.87	18	60	2	5000	1180	8000	4700	6.6	ADQ	22	ADQ
RIDGE AV (SR 2001)																
US 29 -- 13th St	kan	0.74	5.5	18.3	0.46	18	60	2	5000	3100	9600	1100	J	ADQ	J	ADQ
13th St -- Jackson Park Rd	kan	0.84	11.0	18.3	0.52	36	60	2	15000	5100	15000	2200	ADQ	ADQ	ADQ	ADQ
Jackson Park Rd -- NC 136	kan	2.02	11.0	18.3	1.25	36	60	2	15000	3300	15000	1100	ADQ	ADQ	ADQ	ADQ
NC 136 -- Universal St	kan	1.69	11.0	18.3	1.05	36	60	2	15000	3600	15000	1400	ADQ	ADQ	ADQ	ADQ
Universal St -- Dakota St	kan	1.21	11.0	18.3	0.75	36	60	2	15000	3400	15000	1000	ADQ	ADQ	ADQ	ADQ
Dakota St -- Winecoff School Rd	kan	2.00	11.0	18.3	1.24	36	60	2	15000	2800	15000	2000	ADQ	ADQ	ADQ	ADQ
Winecoff School Rd -- US 29	kan	1.05	11.0	18.3	0.65	36	60	2	15000	2240	15000	2600	ADQ	ADQ	ADQ	ADQ
ROBERTA RD (SR 1304)																
Old Charlotte Rd -- Westside Conn	con	4.10	5.5	18.3	2.54	18	60	2	5000	5000	28000	10000	C	27	C	90
Westside Conn -- Blackwelder Rd	con	1.68	5.5	18.3	1.04	18	60	2	5000	2900	28000	15700	C	27	C	90
Blackwelder Rd -- Pitts School Rd	con	0.77	5.5	18.3	0.48	18	60	2	5000		28000	13000	C	27	C	90
Pitts School RD -- Northern Corridor	har	1.63	5.5	18.3	1.01	18	60	2	5000	3840	28000	10000	C	27	C	90
Northern Corridor -- NC 49	har	0.92	5.5	18.3	0.57	18	60	2	5000	3500	28000	11000	C	27	C	90

L*-eight lanes ADQ-adequate B*-substandard

SECTION	Existing Cross-section										Recommended Cross-section					
	loc	dist (km)	rdwy (m)	row (m)	dist (mi)	rdwy (ft)	row (ft)	lane (#)	Cap93 (veh)	1993 ADT	Cap20 (veh)	2020 ADT	rdwy (X)	row (m)	rdwy (X)	row (ft)
ROBINSON CHURCH RD (SR 1166)																
PAB -- Tom Query Rd	har	2.55	5.5	18.3	1.58	18	60	2	5000	4400	10000	9000	K	21	K	70
Stalling Rd -- NC 49	har	0.82	6.7	18.3	0.51	22	60	2	8000		9600	7000	J	18	J	60
ROCK HILL CHURCH RD (SR 1414)																
Poplar Tent Rd -- Weddington Rd	con	1.95	6.7	15.2	1.21	22	50	2	8000	3500	9600	3400	J	18	J	60
Weddington Rd -- US 29	con	1.27	7.3	18.3	0.79	24	60	2	10000	6800	12000	10000	I	21	I	70
ROCKY RIVER RD (SR 1139)																
NC 49 -- Rocky River	cab	4.76	6.1	18.3	2.95	20	60	2	6500	2400	18000	9000	G	21	G	70
Rocky River -- Stallings Rd	cab	1.20	5.5	18.3	0.74	18	60	2	5000		18000	8200	G	21	G	70
Stallings Rd -- Robinson Church Rd	cab	4.30	5.5	18.3	2.67	18	60	2	5000		18000	7000	G	21	G	70
Robinson Church Rd -- Meck Co	cab	2.42	5.5	18.3	1.50	18	60	2	5000		18000	6500	G	21	G	70
ROGERS LAKE RD (SR 1625)																
Westside Conn -- Dogwood Ext	kan	2.23	5.5	18.3	1.38	18	60	2	5000	1500	10000	4800	K	21	K	70
Dogwood Ext -- Oakwood Av	kan	1.81	5.5	18.3	1.12	18	60	2	5000	3700	10000	5700	K	21	K	70
Oakwood Av -- Universal St	kan	0.84	5.5	18.3	0.52	18	50	2	5000	5200	9600	5500	J	18	J	60
RYDER RD (SR 1210)																
Mt Moriah Church Rd -- Main St	lan	1.13	9.1	18.3	0.70	30	60	2	12000	2120	12000	8000	ADQ	ADQ	ADQ	ADQ
Main St -- US 29	lan	1.06	9.1	18.3	0.66	30	60	2	12000	4300	12000	9700	ADQ	ADQ	ADQ	ADQ
SCHOOL CIRCLE (SR 1163)																
Robinson Church Rd -- NC 49	har	0.66	5.5	18.3	0.41	18	60	2	5000	2000	9600	3000	J	ADQ	J	ADQ
SHAMROCK RD (SR 1160)																
Southern Corr -- Shamrock Rd	har	0.80	--	--	0.50	--	--	--	--		10000	1200	K	21	K	70
Shamrock Rd -- Pharr Mill Rd	har	1.61	9.1	18.3	1.00	30	60	2	12000	500	12000	1600	ADQ	21	ADQ	70

L*-eight lanes ADQ-adequate B*-substandard

SECTION	Existing Cross-section										Recommended Cross-section					
	loc	dist (km)	rdwy (m)	row (m)	dist (mi)	rdwy (ft)	row (ft)	lane (#)	Cap93 (veh)	1993 ADT	Cap20 (veh)	2020 ADT	rdwy (X)	row (m)	rdwy (X)	row (ft)
SOUTHERN CORRIDOR																
NC 49 -- Stallings Rd	har	1.37	--	--	0.85	--	--	--	--		10000	5200	K	21	K	70
Stallings -- Robinson Church Rd	har	2.29	--	--	1.42	--	--	--	--		10000	6000	K	21	K	70
SPEEDWAY/KINGS GRANT BOULEVARD																
Derita Rd -- I-85	cab	1.69	--	--	1.05	--	--	--	--	--	28000	11600	C	27	C	90
I-85 -- US 29	con	3.44	--	--	2.13	--	--	--	--	--	36000	34200	B	33	B	110
STALLINGS RD (SR 1161)																
Alexander Dr -- Robinson Church Rd	har	0.39	--	--	0.24	--	60	--	--	--	16000	5000	H	18	H	60
Robinson Church Rd -- Rocky River Rd	har	4.50	5.5	18.3	2.79	18	60	2	5000	2700	16000	7000	H	18	H	60
THOM ST (SR 1232)																
Main St -- US 29	cg	0.68	7.3	18.3	0.42	24	60	2	10000	2700	9600	3000	J	18	J	60
TOM QUERY RD (SR 1166)																
PAB -- Caldwell Rd	har	0.66	5.5	18.3	0.41	18	60	2	5000		9600	8000	J	ADQ	J	ADQ
Caldwell Rd -- Robinson Church Rd	har	1.61	5.5	18.3	1.00	18	60	2	5000		9600	10000	J	ADQ	J	ADQ
TRINITY CHURCH RD (SR 1622)																
NC 73 -- Orphanage Rd	cab	0.65	6.7	18.3	0.40	22	60	2	8000	6200	28000	14800	C	27	C	90
Orphanage Rd -- Westside Conn	cab	1.50	6.7	18.3	0.93	22	60	2	8000	6000	28000	12500	C	27	C	90
Westside Conn -- Drakeside Rd	cab	3.40	5.5	18.3	2.11	18	60	2	5000	2200	10000	7100	K	ADQ	K	ADQ
TUCKASEEGEE RD (SR 1616)																
NC 136 -- Plum Rd	cab	0.90	5.5	18.3	0.56	18	60	2	5000	2640	8000	3900	6.6	ADQ	22	ADQ
Plum Rd -- Westside Conn	cab	1.94	5.5	18.3	1.20	18	60	2	5000	1000	8000	1400	6.6	ADQ	22	ADQ
Westside Conn -- Enochville Av	cab	0.65	5.5	18.3	0.40	18	60	2	5000		8000	2800	6.6	ADQ	22	ADQ

L*-eight lanes ADQ-adequate B*-substandard

SECTION	Existing Cross-section										Recommended Cross-section					
	loc	dist (km)	rdwy (m)	row (m)	dist (mi)	rdwy (ft)	row (ft)	lane (#)	Cap93 (veh)	1993 ADT	Cap20 (veh)	2020 ADT	rdwy (X)	row (m)	rdwy (X)	row (ft)
TURKEY RD (SR 1349,2205)																
Moose Rd -- Lane St	row	1.35	5.5	18.3	0.84	18	60	2	5000	820	8000	1300	6.6	ADQ	22	ADQ
UNION ST (US 601 BUS)																
Corban Av -- Wilshire Av	con	1.74	11.0	18.3	1.08	36	60	3	16000	14000	16000	8800	ADQ	ADQ	ADQ	ADQ
Wilshire Av -- Manor Av	con	1.11	11.0	18.3	0.69	36	60	3	16000	11900	16000	6300	ADQ	ADQ	ADQ	ADQ
Manor Av -- NC 136	con	1.10	7.3	18.3	0.68	24	60	2	10000	9160	10000	4500	ADQ	ADQ	ADQ	ADQ
NC 136 -- US 601	con	0.82	11.0	18.3	0.51	36	60	4	16000	6800	28000	15000	C	21	C	90
US 29 (CANNON BLVD)																
I-85 -- NC 152	cg	1.44	12.2	30.5	0.89	40	100	4	18000	7700	28000	7600	F	33	F	110
NC 152 -- Kimball St	cg	3.66	14.6	30.5	2.27	48	100	4	20000	12700	28000	18000	ADQ	33	ADQ	110
Kimball St -- Ryder Av	lan	1.44	12.2	30.5	0.89	40	100	4	20000	13000	28000	17200	F	33	F	110
Ryder Av -- Chapel St	lan	1.48	14.6	30.5	0.92	48	100	4	20000	13200	28000	18200	ADQ	33	ADQ	110
Chapel St -- 22nd St	kan	0.69	14.6	30.5	0.43	48	100	4	20000	15700	28000	28000	ADQ	33	ADQ	110
22nd St -- Lane St	kan	2.44	14.6	30.5	1.51	48	100	4	20000	17000	28000	23000	ADQ	33	ADQ	110
Lane St -- NC 136	kan	2.98	14.6	30.5	1.85	48	100	4	20000	23400	28000	23000	ADQ	33	ADQ	110
NC 136 -- Dakota St	kan	1.00	19.5	30.5	0.62	64	100	4	28000	23100	28000	19500	ADQ	ADQ	ADQ	ADQ
Dakota St -- I-85	kan	2.44	22.6	30.5	1.51	74	100	4	30000	24000	30000	21200	ADQ	ADQ	ADQ	ADQ
I-85 -- Church St	con	1.32	24.4	30.5	0.82	80	100	4	34000	36000	40000	38000	B	33	B	110
Church St -- Central Av	con	1.53	14.6	36.6	0.95	48	120	4	20000	30500	28000	21200	C	ADQ	C	ADQ
Central Av -- Poplar Tent Rd	con	1.37	14.6	36.6	0.85	48	120	4	20000	31300	28000	21000	C	ADQ	C	ADQ
Poplar Tent Rd -- Weddington Rd Ext	con	1.24	14.6	36.6	0.77	48	120	4	20000	32000	28000	27000	C	ADQ	C	ADQ
Weddington Rd Ext -- US 601	con	0.37	14.6	36.6	0.23	48	120	4	20000	32900	28000	21400	C	ADQ	C	ADQ
US 601 --Cabarrus Av	con	0.55	15.2	36.6	0.34	50	120	4	20000	14900	28000	9800	C	ADQ	C	ADQ
Cabarrus Av -- Rock Hill Church Rd	con	0.47	14.6	36.6	0.29	48	120	4	28000	25300	40000	31000	B	ADQ	B	ADQ
Rock Hill Church Rd -- Westside Conn	con	3.26	14.6	36.6	2.02	48	120	4	28000	18900	34000	22000	D	ADQ	D	ADQ
Westside Conn -- Pitts School Rd	con	2.18	14.6	36.6	1.35	48	120	4	28000	16700	34000	27000	D	ADQ	D	ADQ
Pitts School Rd -- Rocky River	con	1.61	14.6	36.6	1.00	48	120	4	28000		34000	31000	D	ADQ	D	ADQ
Rocky River -- Speedway Blvd	con	1.29	14.6	30.5	0.80	48	100	4	28000	18000	34000	34000	D	33	D	110

L*-eight lanes ADQ-adequate B*-substandard

SECTION	Existing Cross-section										Recommended Cross-section					
	loc	dist (km)	rdwy (m)	row (m)	dist (mi)	rdwy (ft)	row (ft)	lane (#)	Cap93 (veh)	1993 ADT	Cap20 (veh)	2020 ADT	rdwy (X)	row (m)	rdwy (X)	row (ft)
Speedway Blvd -- Morehead Rd	con	0.45	14.6	30.5	0.28	48	100	4	28000		40000	51000	B	33	B	110
Morehead Rd -- Caldwell Rd Ext	cab	0.45	14.6	30.5	0.28	48	100	4	28000	17500	40000	36200	B	33	B	110
Caldwell Rd Ext -- Meck Co	cab	1.98	14.6	30.5	1.23	48	100	4	28000	17280	34000	30500	D	33	D	110
US 601																
US 29 -- Cabarrus Av	con	0.50	19.5	30.5	0.31	64	100	2	28000	17300	28000	11600	C	ADQ	C	ADQ
Cabarrus Av -- Wilshire Av	con	2.68	14.6	30.5	1.66	48	100	2	20000	18700	28000	22900	C	ADQ	C	ADQ
Wilshire Av -- Union St	con	3.18	12.8	30.5	1.97	42	100	2	18000	16360	28000	17200	C	ADQ	C	ADQ
Union St -- NC 49	con	0.32	12.8	30.5	0.20	42	100	2	18000	17700	36000	29900	B	33	B	110
NC 49 -- Flowes Store Rd	cab	1.56	9.8	30.5	0.97	32	100	2	12000	15800	36000	27600	B	33	B	110
Flowes Store Rd -- PAB	cab	2.48	9.8	30.5	1.54	32	100	2	12000	9780	28000	20900	F	ADQ	F	ADQ
UNITY RD (SR 1355,1614)																
PAB -- Deal Rd	row	0.77	5.5	18.3	0.48	18	60	2	5000	380	8000	800	6.6	ADQ	22	ADQ
Deal Rd -- Plum Rd	row	4.48	6.1	18.3	2.78	20	60	2	6500	1000	8000	2000	6.6	ADQ	22	ADQ
UNIVERSAL ST (SR 1166)																
Rogers Lake Rd -- NC 136	kan	1.39	7.3	18.3	0.86	24	60	2	10000	6900	10000	3500	ADQ	ADQ	ADQ	ADQ
UPPER ENOCHVILLE RD (SR 1104)																
Enochville Av -- West A St	kan	4.42	5.5	18.3	2.74	18	60	2	5000	1400	8000	1300	6.6	ADQ	22	ADQ
WEDDINGTON RD (SR 1431)																
Speedway Blvd -- Pitts School Rd	con	2.82	--	--	1.75	--	--	--	--	--	22000	11800	G	21	G	70
Pitts School Rd -- Rock Hill Ch Rd	con	6.26	6.7	18.3	3.88	22	60	2	8000	3820	16000	15400	H	18	H	60
Rock Hill Church Rd -- US 29	con	1.68	--	--	1.04	--	--	--	--	--	16000	7000	H	18	H	60
WEST A ST (SR 1100)																
Main St -- Loop Rd	kan	4.53	6.1	18.3	2.81	20	60	2	6500	2300	9600	2800	J	18	J	60

L*-eight lanes ADQ-adequate B*-substandard

SECTION	Existing Cross-section										Recommended Cross-section					
	loc	dist (km)	rdwy (m)	row (m)	dist (mi)	rdwy (ft)	row (ft)	lane (#)	Cap93 (veh)	1993 ADT	Cap20 (veh)	2020 ADT	rdwy (X)	row (m)	rdwy (X)	row (ft)
WEST C ST (SR 1124,1680)																
Westside Conn -- Enochville Av	row	0.68	--	--	0.42	--	--	--	--		16000	4000	H	21	H	70
Enochville Av -- Loop Rd	kan	3.94	7.3	18.3	2.44	24	60	2	10000	6900	16000	9300	H	21	H	70
WESTSIDE CONNECTOR (SR 1309,1310,1430,1624,1350)																
NC 49 -- Roberta Rd	cab	2.95	6.1	18.3	1.83	20	60	2	6500	1200	30000	16500	A	61	A	200
Roberta Rd -- Roberta Church Rd	cab	0.53	--	--	0.33	--	--	--	--		30000	26600	A	61	A	200
Roberta Church Rd -- US 29	con	2.29	7.3	18.3	1.42	24	60	2	10000	3200	30000	27900	A	61	A	200
US 29 -- Weddington Rd	cab	2.05	--	--	1.27	--	--	--	--		30000	22100	A	61	A	200
Weddington Rd -- Poplar Tent Rd	cab	1.73	6.1	18.3	1.07	20	60	2	6500		28000	26000	C	27	C	90
Poplar Tent Rd -- I-85	cab	0.95	6.1	18.3	0.59	20	60	2	6500	1600	28000	29200	C	27	C	90
I-85 -- NC 73	cab	2.23	6.1	15.2	1.38	20	50	2	6500		28000	27400	C	27	C	90
NC 73 -- Trinity Church Rd	cab	1.85	--	--	1.15	--	--	--	--		30000	19500	A	61	A	200
Trinity Church Rd -- NC 136	cab	4.76	7.3	18.3	2.95	24	60	2	10000	3500	30000	16000	A	61	A	200
NC 136 -- Tuckaseegee Rd	cab	1.94	--	--	1.20	--	--	--	--		30000	10200	A	61	A	200
Tuckaseegee Rd -- West C St	row	1.31	--	--	0.81	--	--	--	--		30000	7600	A	61	A	200
West C St -- Enochville School Rd	row	2.21	--	--	1.37	--	--	--	--		30000	9900	A	61	A	200
Enochville School Rd -- Enochville Rd	row	1.02	--	--	0.63	--	--	--	--		30000	6400	A	61	A	200
Enochville Rd -- Saw Rd	row	2.76	--	--	1.71	--	--	--	--		30000	3100	A	61	A	200
Saw Rd -- NC 152	row	0.79	6.1	18.3	0.49	20	60	2	6500		30000	3900	A	61	A	200
NC 152 -- PAB	row	0.40	6.1	18.3	0.25	20	60	2	6500	1800	30000	6000	A	61	A	200
WILSHIRE AV (SR 1157)																
Old Charlotte Rd -- US 601	con	1.60	6.1	18.3	0.99	20	60	2	6500	3900	18000	5400	G	21	G	70
US 601 -- Union St	con	2.13	6.1	18.3	1.32	20	60	2	6500	5300	18000	10000	G	21	G	70
Union St -- NC 136	con	1.24	--	--	0.77	--	--	--	--		18000	16500	G	21	G	70
WINDY RD (SR 1442)																
NC 136 -- Odell School Rd	cab	2.32	7.3	18.3	1.44	24	60	2	10000		10000	5800	ADQ	ADQ	ADQ	ADQ

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SECTION	Existing Cross-section										Recommended Cross-section					
	loc	dist (km)	rdwy (m)	row (m)	dist (mi)	rdwy (ft)	row (ft)	lane (#)	Cap93 (veh)	1993 ADT	Cap20 (veh)	2020 ADT	rdwy (X)	row (m)	rdwy (X)	row (ft)
WINECOFF SCHOOL RD (SR 1790)																
NC 73 -- I-85	con	1.00	6.1	18.3	0.62	20	60	2	6500	3700	9600	6000	J	18	J	60
I-85 -- Main St	kan	1.47	6.1	15.2	0.91	20	50	2	6500	4500	9600	5900	J	18	J	60
Main St -- Ridge Av	kan	0.08	6.1	15.2	0.05	20	50	2	6500	6000	9600	6600	J	18	J	60
WRIGHT RD (SR 1359,1363)																
Enochville School Rd -- Mill Creek	row	3.90	6.1	18.3	2.42	20	60	2	6500	760	8000	1500	6.6	18	22	60
Mill Creek -- Westside Connector	row	1.65	--	--	1.02	--	--	--			8000	1500	6.6	18	22	60
ZION CHURCH RD (SR 1482,1155,1152)																
US 601 -- NC 49	cab	1.76	6.1	18.3	1.09	20	60	2	6500	3200	18000	14000	G	21	G	70
NC 49 -- Archibald Rd	cab	3.15	6.1	18.3	1.95	20	60	2	6500	1700	18000	9000	G	21	G	70
Archibald Rd -- Flowes Stores Rd	cab	2.79	6.1	18.3	1.73	20	60	2	6500	1000	18000	8000	G	21	G	70
ZION CHURCH RD EAST (SR 1153)																
Zion Church Rd -- US 601	cab	2.61	6.7	18.3	1.62	22	60	2	8000	1400	8000	5800	ADQ	ADQ	ADQ	ADQ

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